Enterasys® Wireless

Standalone 802.11n AP

User Guide

Firmware Version 7.12.01.xxxx

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About This Guide

This guide describes how to configure and manage the Enterasys Wireless Standalone 802.11n AP.

For information about the CLI (Command Line Interface) set of commands used to configure and manage the AP, refer to the *Enterasys Wireless Standalone 802.11n AP CLI Reference Guide*.

Who Should Use This Guide

This guide is a reference for users and administrators who are responsible for configuring and managing the AP.

How to Use This Guide

Read through this guide completely to familiarize yourself with its contents and to gain an understanding of the features and capabilities of the AP. A general working knowledge of data communications networks and wireless networking is helpful when setting up the AP.

This preface provides an overview of this guide and a brief summary of each chapter; defines the conventions used in this document; and instructs how to obtain technical support from Enterasys Networks. To locate information about various subjects in this guide, refer to the following table:

For...	Refer to...
An overview of the AP and a list of features.	**Chapter 1**, **Introduction**
An introduction to networking concepts and an overview of the AP's management capabilities.	Chapter 2, **Configuring Your Network**
First time setup and basic configuration of the AP including, how to log on to the user interface, downloading firmware, changing passwords, and getting help.	**Chapter 3**, **Getting Started with your Enterasys Wireless Standalone 802.11n AP**
Procedures to configure the various capabilities of the AP.	Chapter 4, **Configuring the Enterasys Wireless Standalone 802.11n AP**
An overview of Wireless Distribution Systems (WDS) and the process to set up a WDS.	Chapter 5, **Configuring WDS**
Information about the various AP status views.	Chapter 6, **Viewing Wireless Access Point Information**
A list of supported SNMP traps and MIBs.	Chapter B, **SNMP Traps and MIBs**
Troubleshooting information.	Appendix A, **Troubleshooting**
Regulatory information for the AP.	Appendix C, **Regulatory Information**
A list of commonly used terms and acronyms, and their definitions.	Appendix D, **Glossary**

Related Documents

The manuals listed below can be obtained from the World Wide Web in Adobe Acrobat Portable Document Format (PDF) at the following site:

http://www.enterasys.com/support/manuals

- *Enterasys Wireless Standalone 802.11n AP Installation Instructions*
- *Enterasys Wireless Standalone 802.11n AP CLI Reference Guide*

Conventions Used in This Guide

The following conventions are used in the text of this document:

Convention	Description
Bold font	Indicates mandatory keywords, parameters or keyboard keys.
italic font	Indicates complete document titles.
`Courier` font	Used for examples of information displayed on the screen.
`Courier` font in italics	Indicates a user-supplied value, either required or optional.
[ ]	Square brackets indicate an optional value.
{ }	Braces indicate required values. One or more values may be required.
|	A vertical bar indicates a choice in values.
[x | y | z]	Square brackets with a vertical bar indicates a choice of a value.
{x | y | z}	Braces with a vertical bar indicate a choice of a required value.
[x {y | z}]	A combination of square brackets with braces and vertical bars indicates a required choice of an optional value.

The following icons are used in this guide:

Note: Calls the reader's attention to any item of information that may be of special importance.

Caution: Contains information essential to avoid damage to the equipment.

Precaución: Contiene información esencial para prevenir dañar el equipo.

Achtung: Verweißt auf wichtige Informationen zum Schutz gegen Beschädigungen.

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To send comments or suggestions concerning this document to the Technical Publications Department: techpubs@enterasys.com To expedite your message, include the document Part Number in the Email message.	

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- A description of the failure
- A description of any action(s) already taken to resolve the problem (for example, changing mode switches or rebooting the unit)
- The serial and revision numbers of all involved Enterasys Networks products in the network
- A description of your network environment (such as layout, cable type, other relevant environmental information)
- Network load and frame size at the time of trouble (if known)
- The device history (for example, if you have returned the device before, or if this is a recurring problem)
- Any previous Return Material Authorization (RMA) numbers

1

Introduction

This chapter introduces the Enterasys Wireless Standalone 802.11n Access Point (AP) and provides an overview of the AP's applications, features, and policy.

Standalone AP Overview	Refer to page...
About the Enterasys Wireless Standalone 802.11n AP	1-1
Applications	1-2
Features	1-2

About the Enterasys Wireless Standalone 802.11n AP

The Enterasys Wireless Standalone 802.11n AP provides secure, highly scalable, wireless high-speed data communication between the wired LAN and fixed or mobile devices equipped with an 802.11a, 802.11b, 802.11g, and/or 802.11n wireless adapter. This solution offers fast, reliable wireless connectivity with considerable cost savings over wired LANs (which include long-term maintenance overhead for cabling).

The Enterasys Wireless Standalone 802.11n AP is an IEEE 802.11n-compliant access point that offers significant increase in data throughput and coverage range without additional bandwidth or transmit power. With both 2.4 GHz and 5 GHz 802.11n standard radio modules, the AP delivers total data rates of up to 300 Mbps. Given that the improved throughput of 300 Mbps will be spread over a number of simultaneous users, the performance of the AP will be close to that of a wired 100 Mbps Ethernet connection — the standard for desktop connectivity. With the Enterasys Wireless Standalone 802.11n AP, mobile users get a similar experience to wired networks while accessing high-bandwidth data, voice, and video applications. The Enterasys Wireless Standalone 802.11n AP is a cost-effective solution that is both easy to manage and easy to deploy.

The AP supports up to eight virtual access points (VAP) per physical radio interface: eight on the 802.11a/n radio and eight on the 802.11b/g/n radio. For each VAP, you can apply different security settings, VLAN assignments, and other parameters. Each radio interface on the AP can operate in one of three ways:

- **Access Point** – Providing connectivity to wireless clients in the service area.
- **Bridge** (Point-to-Point) – Providing links to other access points in "Bridge" or "Root AP" mode connecting wired LAN segments.
- **Root AP** (Point-to-Multipoint) – Providing links to other access points in "Bridge" mode connecting wired LAN segments.

In addition, the AP offers full network management capabilities through an easy to configure web interface, a command line interface for initial configuration and troubleshooting, and support for Simple Network Management (SNMP) tools.

Applications

The Enterasys Wireless Standalone 802.11n AP offers a high speed, reliable, cost-effective solution for wireless client access to the network in environments such as:

- Remote access to corporate network information
- Difficult-to-wire environments
- Frequently changing environments
- Retailers, manufacturers, and banks that frequently rearrange the workplace or change location
- Temporary LANs for special projects or peak times
- Auditors who require workgroups at customer sites
- Access to databases for mobile workers, for example: doctors, nurses, retailers, or white-collar workers who need access to databases while being mobile in a hospital, retail store, or an office campus

Features

The Enterasys Wireless Standalone 802.11n AP provides the following features:

Standalone solution AP for the Small to Medium Enterprise (SME) market

- End-to-end solution for wireless real-time IP communication and integration
- Best-in-class voice quality, multimedia enabled
- Automatic channel selection
- Seamless roaming within the IEEE 802.11a/b/g/n WLAN environment
- (AP 3640 only) Three external antenna connectors for use with both indoor and outdoor antennas

Ease of management

- Manageable through secure web management, CLI interface, and SNMP
- Support for advanced manageability through Enterasys NetSight Console and NetSight Inventory Manager

Standards compliance

- Strong SME level security, supporting WEP, WPAv1, and WPAv2
- IEEE 802.11a, 802.11b, 802.11g, and 802.11n compliance
- Backward compatible with existing 802.11a/b/g networks

2

Configuring Your Network

Proper configuration of a wireless network requires an understanding of the AP's components and security features. The following sections discuss some network options focused around the use of the Enterasys Wireless Standalone 802.11n AP. The AP's network management, security, and authentication abilities are also discussed.

For information about...	Refer to page...
Wireless Networking Concepts	2-1
About Clustering	2-4
RADIUS Authentication	2-5
About Network Security	2-5
About Quality of Service	2-6

Wireless Networking Concepts

Wireless communication between two or more computers requires that each computer be equipped with a receiver/transmitter—a WLAN network adapter—capable of exchanging digital information over a common radio frequency. This setup is called an ad hoc configuration. An ad hoc network allows wireless devices to communicate with each other using an Independent Basic Service Set (IBSS).

An alternative to an ad hoc configuration is the use of an AP. Computers and other wireless devices communicate with each other through the AP. The IEEE 802.11 standard defines an AP as a device that allows other wireless devices to communicate with a distribution system using a Basic Service Set (BSS) or an infrastructure network.

For the wireless devices to communicate with computers on a wired network, the APs must be connected into the wired network, and provide access to the networked computers. This is called bridging.

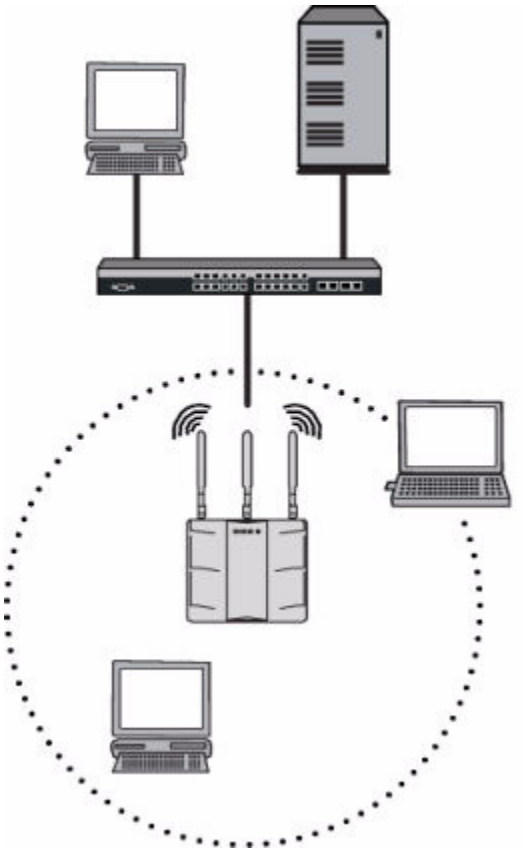
Infrastructure Wireless LAN

The AP provides wireless workstations with access to a wired LAN. An integrated wired/wireless LAN is called an infrastructure configuration. A BSS consists of a group of wireless PC users, and an AP that directly connects to the wired LAN. Each wireless PC in this BSS can talk to any computer in its wireless group via a radio link, or access other computers or network resources in the wired LAN infrastructure via the AP.

The infrastructure configuration not only extends the accessibility of wireless PCs to the wired LAN, but also increases the effective wireless transmission range for wireless PCs by passing their signal through one or more APs.

A wireless infrastructure can be used for access to a central database, or for connection between mobile workers, as shown in Figure 2-1.

Figure 2-1 Infrastructure Wireless LAN



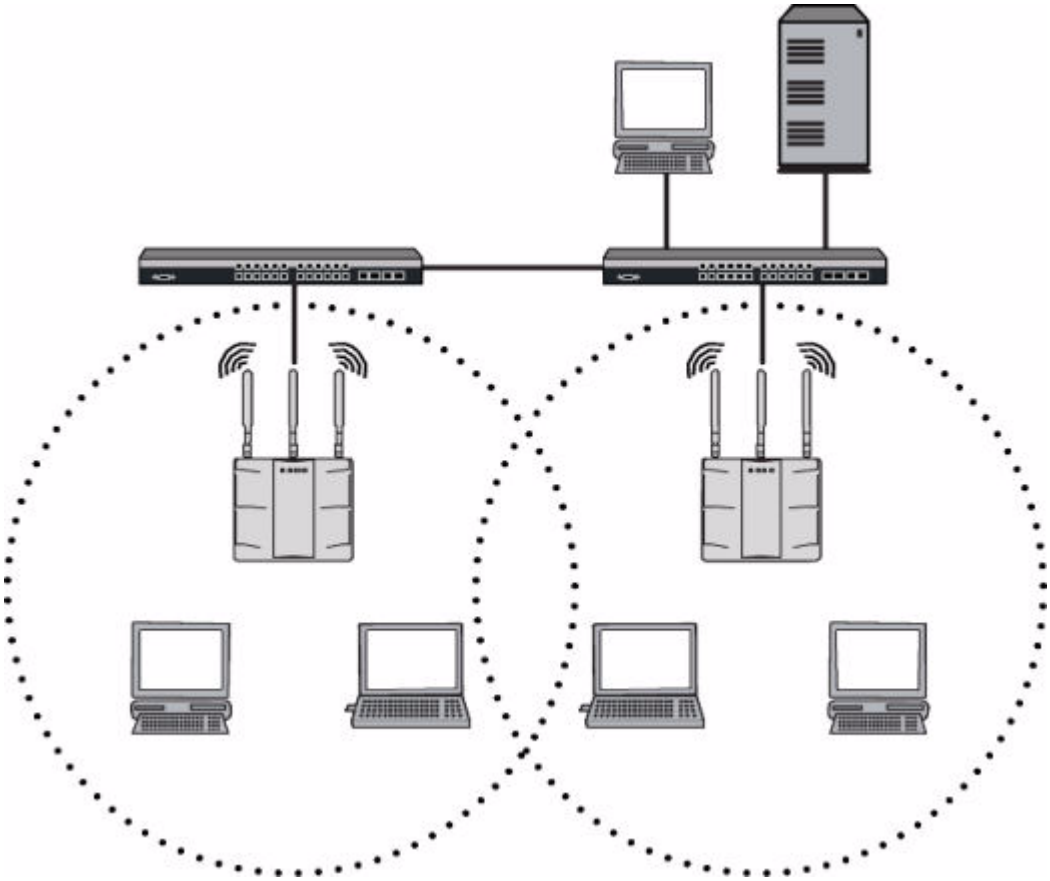
Infrastructure Wireless LAN for Roaming Wireless PCs

The BSS defines the communications domain for each AP and its associated wireless clients. The BSS ID is a 48-bit binary number based on the AP's wireless MAC address, and is set automatically and transparently as clients associate with the AP. The BSS ID is used in frames sent between the AP and its clients to identify traffic in the service area.

The BSS ID is only set by the AP, never by its clients. The clients only need to set the Service Set Identifier (SSID) that identifies the service set provided by one or more APs. The SSID can be manually configured by the clients, can be detected in an AP's beacon, or can be obtained by querying for the identity of the nearest AP. For clients that do not need to roam, set the SSID for the wireless device to that used by the AP to which you want to connect.

A wireless infrastructure can also support roaming for mobile workers. You can configure more than one AP to create an Extended Service Set (ESS), as shown in Figure 2-2 on page 2-3. By placing the APs so that a continuous coverage area is created, wireless users within this ESS can roam freely. All wireless network adapters and APs within a specific ESS must be configured with the same SSID.

Figure 2-2 Infrastructure Wireless LAN for Roaming

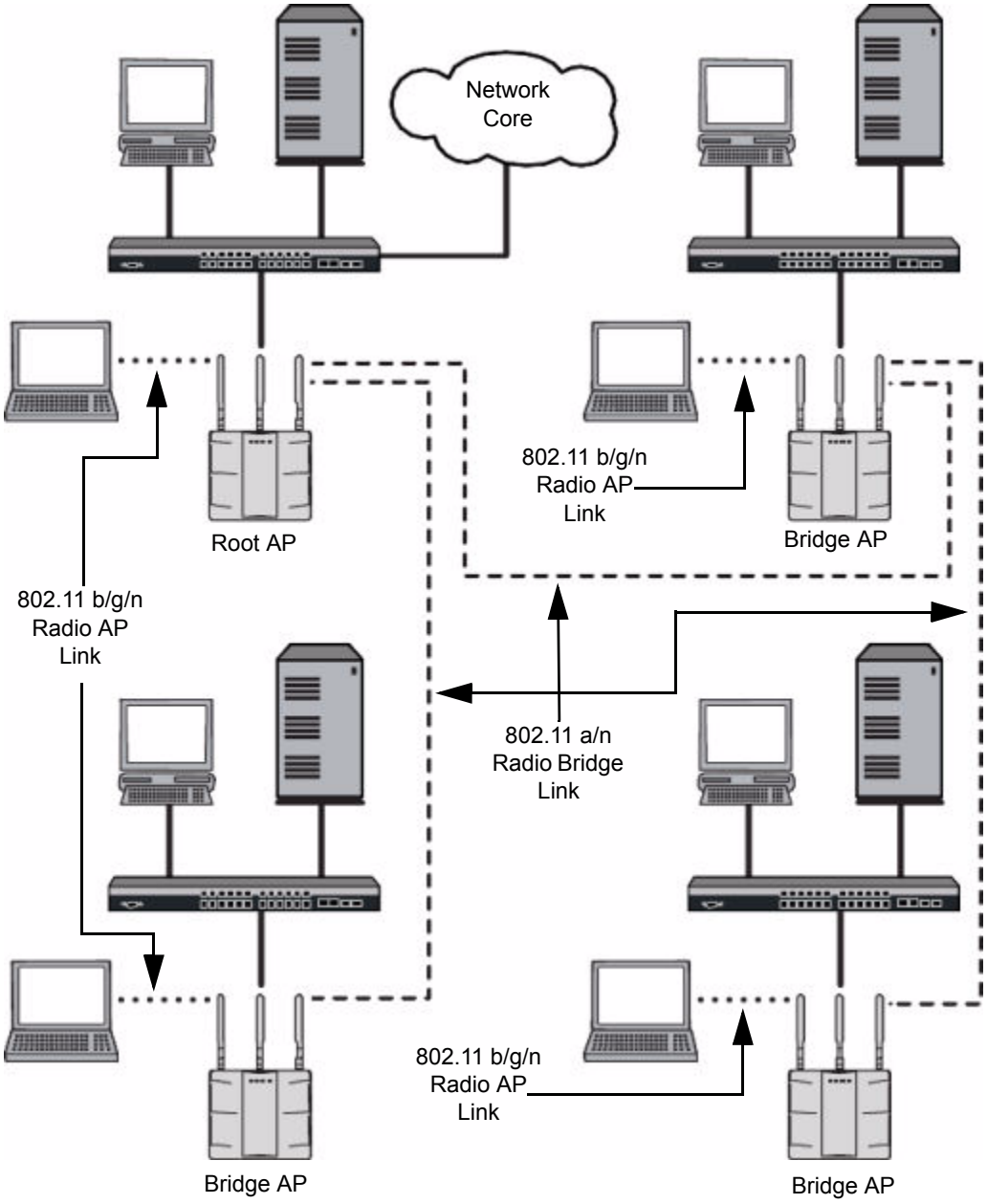


Infrastructure Wireless Bridge

The IEEE 802.11 standard defines a Wireless Distribution System (WDS) for bridge connections between BSS areas (APs). The AP uses WDS to forward traffic on links between units.

The AP supports WDS links on either the 5 GHz (802.11a/n) or 2.4 GHz (802.11b/g/n) bands and can be used with various external antennas to offer flexible deployment options. Up to 12 WDS links (six per radio) can be specified for each unit in the wireless network. Only one unit must be configured as the "root AP" in the wireless network. The root AP should be the unit connected to the main core of the wired LAN. Other WDS APs must configure one "parent" link to the root or to a WDS AP connected to the root AP. The other five available WDS links can be specified as "child" links to other bridges. This forms a tiered-star topology for the wireless bridge network. When using WDS on a radio band, only wireless bridge units can associate to each other. Wireless clients can only associate with the AP using a radio band set to AP. For more information about WDS, see Chapter 5, **Configuring WDS**.

Figure 2-3 Infrastructure Wireless Bridge



About Clustering

The AP can operate in a cluster setup. A cluster is a group of wireless APs configured to communicate with each other. Mobile users (MU) can seamlessly roam between the APs participating in the cluster. The Enterasys Wireless Standalone 802.11n AP extends basic cluster functionality with the following enhancements:

- Support for fast roaming
- Automatic Channel Selection (ACS) for all APs in the cluster
- Cluster member information is available to the user

- MU statistic history
- Pre-authentication

A cluster forms when APs operating within the same subnet are configured with the same cluster ID (shared secret). A cluster AP can exist at any point in your network. Each cluster member periodically (30 seconds) sends a secure SIAPP multicast message to update other cluster members. The SIAPP message includes:

- The AP Name
- The AP Ethernet MAC address
- The AP IP address
- The client count
- The base BSSIDs for both radios

Each AP caches locally information about other cluster members and maintains its own view of the cluster. For more information about configuring a cluster, see "Configuring General LAN Settings" on page 4-2.

RADIUS Authentication

Remote Authentication Dial-in User Service (RADIUS) is an authentication protocol that uses software running on a central server to control access to RADIUS-aware devices on the network. An authentication server contains a database of user credentials for each user that requires access to the network.

You must specify a primary RADIUS server for the AP to implement IEEE 802.1x network access control and Wi-Fi Protected Access (WPA) wireless security. You can also specify a secondary RADIUS server as a backup should the primary server fail or become inaccessible.

In addition, the configured RADIUS server can also act as a RADIUS accounting server and receive user-session accounting information from the access point. RADIUS accounting can be used to provide valuable information on user activity in the network.

Notes: This guide assumes that you already configured RADIUS server(s) to support the access point. Configuration of RADIUS server software is beyond the scope of this guide. Refer to the documentation provided with the RADIUS server software.

If you are using RADIUS, it is highly recommended that you assign the AP a static IP address to ensure that the address doesn't change via DHCP.

For information about RADIUS configuration, see "Configuring RADIUS Authentication" on page 4-10.

About Network Security

The AP provides features and functionality to control network access. These are based on standard wireless network security practices. Current wireless network security methods provide a degree of protection. These methods include an open system that relies on SSIDs.

The AP supports the following encryption approaches:

- Wired Equivalent Privacy (WEP) – A security protocol for wireless local area networks defined in the IEEE 802.11b standard that provides static key management, and WEP 64-bit, 128-bit, and 152-bit ciphers.

- Wi-Fi Protected Access version 1 (WPA v.1) – A security protocol with Temporal Key Integrity Protocol (TKIP) that provides pre-shared Master Key management, and a WEP 128-bit cipher.
- Wi-Fi Protected Access version 2 (WPA v.2) – A security protocol with Advanced Encryption Standard (AES) that provides pre-shared Master Key management, and an AES 128-bit cipher.

About Quality of Service

The AP provides advanced Quality of Service (QoS) management in order to provide better network traffic flow. Such features include:

- WMM (Wi-Fi Multimedia) — Enabled globally on the AP. For devices with WMM enabled, the standard provides multimedia enhancements for audio, video, and voice applications. WMM shortens the time between transmitting packets for higher priority traffic.
- IP ToS (Type of Service) or DSCP (Diffserve Codepoint) — The ToS/DSCP field in the IP header of a frame indicates the priority and QoS for each frame.
- Pre-WMM — The AP also supports legacy QoS management such as 802.11e, flexible client access, and voice and video admission control.

3

Getting Started with your Enterasys Wireless Standalone 802.11n AP

Before you can begin using the AP, you must complete some preliminary steps. This section discusses the initial process of starting the AP, accessing the interface, and first time configuration.

For information about...	Refer to page...
Powering the AP	3-1
IP Address Assignment and Acquisition	3-2
Managing the AP	3-3
Understanding the Browser Interface	3-5
Configuring the Standalone AP for the First Time	3-9

Powering the AP

You can connect the AP to the wired LAN and provide power to the AP in one of three ways:

- Power over Ethernet (PoE) – If your network is already set up with PoE, attach the LAN Ethernet cable to the RJ45 Ethernet connector at the bottom of the AP. For this method you can use a regular Ethernet cable.
- Power over Ethernet: Adding a PoE injector – If your network is not set up with PoE, you can provide power to the LAN Ethernet cable with a PoE injector. The PoE injector must be 802.3af compliant. The PoE injector is not provided with the AP. If you are using a PoE injector, refer to the manufacturer's documentation for the necessary requirements.
- Power by AC adaptor – An AC adaptor is available for purchase from Enterasys Networks, but not included with the AP. For more information about the AC adaptor, contact your Enterasys sales representative.

  If you are using a direct connection to the AP you can use either a straight-through or cross-over Ethernet cable.

After connecting the AP to the wired LAN and applying power, the AP begins the initialization process. For more information about installing and powering your AP, see the *Enterasys Wireless Standalone 802.11n AP Installation Instructions*.

IP Address Assignment and Acquisition

The APs are shipped from the factory with a default IP address — 192.168.1.20. The default IP address simplifies the first-time IP address configuration process for APs. If the AP fails to acquire an IP address through DHCP, it returns to its default IP address. This behavior ensures that only one AP at a time can use the default IP address on a subnet.

When the AP is powered-on, the following occurs:

1. The AP attempts to reach the DHCP server on the network to acquire the IP address. If the AP is successful in reaching the DHCP server, the DHCP server assigns an IP address to the AP.
2. If the DHCP assignment is not successful in the first 60 seconds, the AP returns to its default IP address.
3. The AP waits for 30 seconds in default IP address mode before again attempting to acquire an IP address from the DHCP server.
4. The process repeats itself until the DHCP assignment is successful, or until an administrator assigns the AP an IP address, using static configuration.

Notes: DCHP assignment is the default method for the AP configuration. DHCP assignment is part of the initialization process.

You can establish a SSH session with the AP during the time window of 30 seconds when the AP returns to its default IP address mode. If a static IP address is assigned during this period, you must reboot the AP for the configuration to take effect.

Discovering DHCP Assigned IP Addresses

To access an AP's management interface, you must know the IP address of the AP. By default the AP tries to obtain its IP address from a DHCP server. To determine the IP addresses assigned to the APs within a domain, Enterasys provides the AP Discovery Tool for download.

The AP Discovery Tool is a Java-based application designed to help keep track of the deployed APs and retrieve their assigned IP addresses. The AP Discovery Tool discovers and lists the APs in the current multicast domain. The AP Discovery Tool can be run on any platform with Java Runtime Environment (JRE 6 update 18 and higher) installed.

To discover DHCP assigned IP addresses:

1. Download the AP Discovery Tool (ApDiscovery.jar) from the Enterasys support site, in the Downloads section, under Firmware & Software, and save locally.

Note: The workstation must be in the same multicast network domain as the deployed APs.

2. Open a command prompt. Navigate to the directory to which you saved the ApDiscovery.jar file.
3. Run the following command:

   ```
   java -jar ApDiscovery.jar
   ```

   The AP Discovery Tool scans the multicast domain and displays the results of the search, as shown below.

```
############################ 2010-04-06 14:33:18 ############################
IP Address        Cluster    MAC Address         AP Name
192.168.7.252     1          00:1A:E8:14:22:D0   N/A
192.168.7.176     1          00:1A:E8:14:10:BA   N/A
192.168.7.236     2          00:12:CF:73:70:3D   00000012CF73702D
192.168.7.254     1          00:1A:E8:14:10:7D   N/A
192.168.7.173     1          00:1A:E8:14:11:B9   N/A
192.168.7.174     2          00:1A:E8:14:10:63   0000001261737111
############################ 2010-04-06 14:33:50 ############################
IP Address        Cluster    MAC Address         AP Name
192.168.7.254     1          00:1A:E8:14:10:7D   N/A
192.168.7.252     1          00:1A:E8:14:22:D0   N/A
192.168.7.176     1          00:1A:E8:14:10:BA   N/A
192.168.7.173     1          00:1A:E8:14:11:B9   N/A
192.168.7.236     2          00:12:CF:73:70:3D   0000001234737023
192.168.7.174     2          00:1A:E8:14:10:63   0000001261737111
```

The information displayed in the output is as follows:

- **IP Address** - The IP address of the discovered AP.
- **Cluster** - If the deployed APs are configured into different clusters, this field allows the operator to find out which APs are in the same cluster. In the above example, there are 2 clusters.
- **MAC Address** - The MAC address of the AP.
- **AP Name** - The name of the AP. The default value is the AP's serial number.

Note: The AP Name field is populated for APs not using Cluster Encryption or the default Cluster Shared Secret (**ThisIsDefaultClusterPassword**). If you have changed the Cluster Shared Secret, you can resolve the AP Name by running the following command:

```
java -jar ApDiscovery.jar -s <modified cluster shared secret>
```

For the full list of AP Discovery Tool commands, launch the help by running the following command:

```
java -jar ApDiscovery.jar -h
```

4. To determine the IP address of a particular AP, first locate the serial number on a label affixed to the AP you that want to configure. Match that serial number with the serial number listed under the AP Name column in the Discovery Tool output. The IP address in the Discovery Tool output that corresponds to the AP serial number is assigned to that AP.

Managing the AP

The Enterasys Wireless Standalone 802.11n AP provides you with multiple management options. You can manage the Enterasys Wireless Standalone 802.11n AP with:

- The Command Line Interface (CLI) accessed through a direct connection to the console port (115kbps, 8 bit no parity) or through a Secure SHell (SSH) connection. For more information about how to use the CLI, and command descriptions, refer to the *Enterasys Wireless Standalone 802.11n AP CLI Reference Guide*.

- The secured web interface accessed through a web browser (the focus of this guide). The AP supports the following web browsers:
  - Internet Explorer v7.0 and 8.0
  - Firefox v3.4 and 3.5
- An SNMP manager, such as Enterasys Networks NetSight management applications. For information about configuring SNMP management, see "Configuring SNMP" on page 4-4.

Accessing and Logging-in to the Web-Based Interface

This section discusses the procedure to access the web-based interface through a supported Web browser. Up to five client sessions can be open at one time.

To access the AP, you must log on using a valid user ID and password. The default user name and password are:

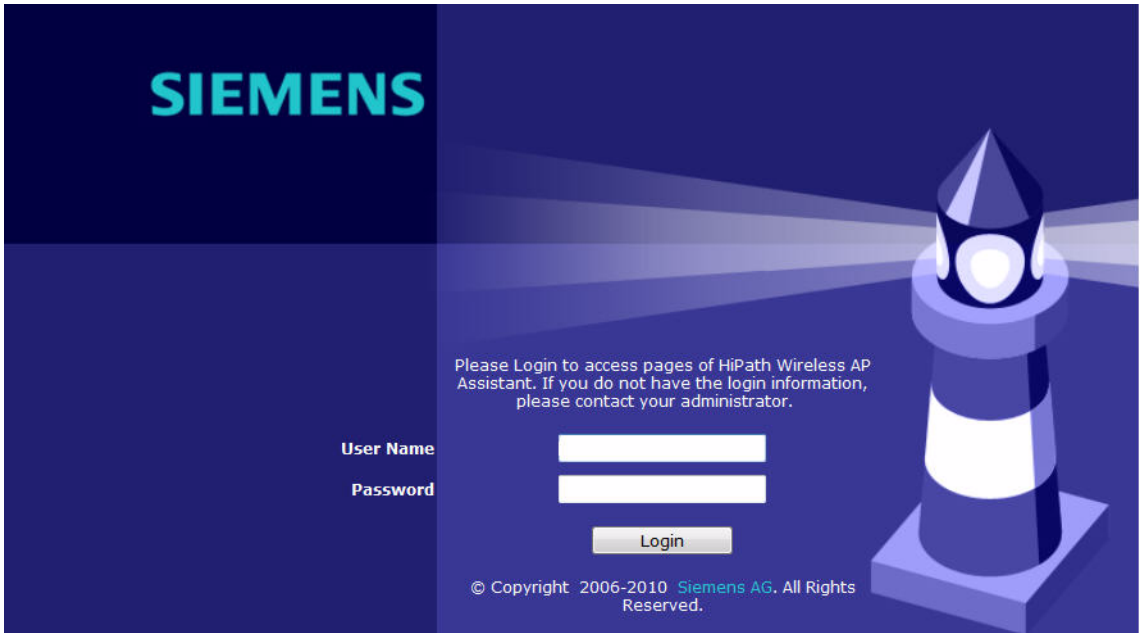
User Name: **admin**

Password: **new2day**

By default, the AP is DHCP-enabled. To log on, use the IP address according to your network DHCP IP address assignment. If the AP cannot get an IP address by DHCP, use the default 192.168.1.20 IP address. For more information, see "IP Address Assignment and Acquisition" on page 3-2.

To display the login screen, type the following in a Web browser:

```
https://<static or DHCP-provided IP address>
```


SIEMENS
Please Login to access pages of HiPath Wireless AP Assistant. If you do not have the login information, please contact your administrator.
User Name
Password
Login
© Copyright 2006-2010 Siemens AG. All Rights Reserved.

Field	Description
User Name	Enter **admin**.
Password	Enter the **Password**. The default password is **new2day**.

To log in to the AP:

Enter the **User Name** and **Password**, then click **Login**. You are now logged-in to the AP as an administrator.

Notes: Enterasys Networks strongly recommends that you change your password the first time you log in.

The Web session will time out after 60 minutes (1 hour) of non-activity.

Understanding the Browser Interface

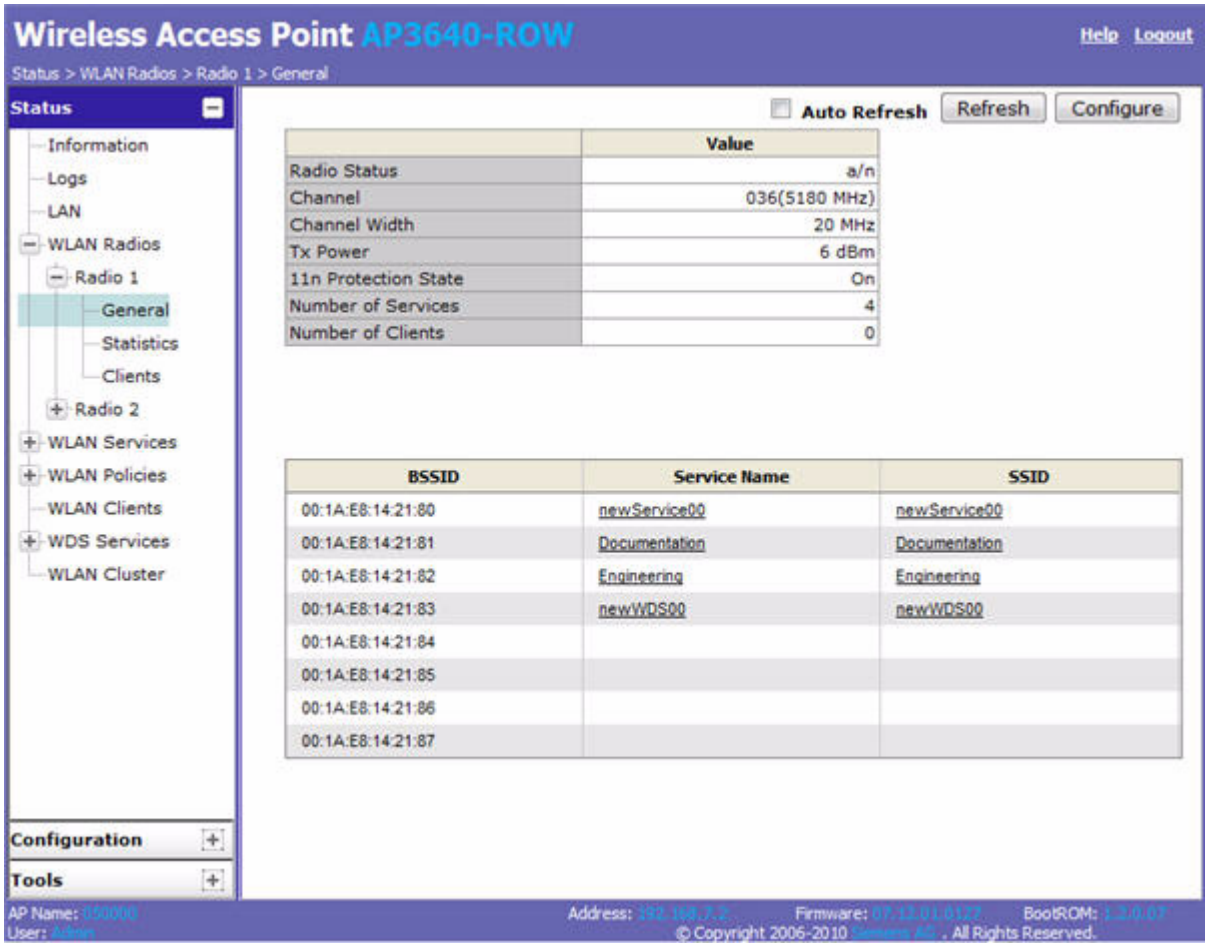
The browser interface provides a way to configure, manage, and monitor the standalone AP. You navigate through the browser interface as you would a typical web page. You use the navigation tree in the left pane to move among pages within the user interface. You can click a link to get details about a selected item.

Each page has four distinct sections:

- Top user interface banner
- Bottom user interface banner
- Navigation tree in the left-hand pane
- User interface page content area in the right-hand pane

Figure 3-1 shows a Standalone AP user interface page.

Figure 3-1 User Interface Page



Understanding the Page Banners

The banner that displays across the top of each page provides general AP information and links to display online help and to logout from the user interface. Figure 3-2 shows the contents of the top banner.

Figure 3-2 Top Banner of the Standalone AP User Interface

Table 3-1 describes the contents of the top banner.

Table 3-1 Contents of the Top Banner

Field/Link	Description
Wireless Access Point <*model_name*>	Displays the model name of the AP managed by the standalone AP user interface. The UI retrieves the model name from the AP firmware. Options include: • AP3640-ROW — an 802.11 AP with external antennas. This AP is certified to operate in areas other than North America. • AP3640-NAM — an 802.11 AP with external antennas. This AP is certified to operate only in North America. • AP3630-ROW — an 802.11 AP with internal antennas. This AP is certified to operate in areas other than North America. • AP3630-NAM — an 802.11 AP with internal antennas. This AP is certified to operate only in North America.
<*path_name*>	Displays the path used to access the page that is displayed in the right hand page content.
Help	Click to navigate to the Enterasys Networks Hardware and Software Manuals page in a new Web browser window.
Logout	Ends the session with the standalone AP user interface. Clicking this link returns you to the login screen.

The banner that displays across the bottom of each page provides information about the AP that you are managing. Figure 3-3 shows the contents of the bottom banner.

Figure 3-3 Standalone AP Bottom Banner

Table 3-2 describes the contents of the bottom banner.

Table 3-2 Contents of the Bottom Banner

Field/Link	Description
AP Name	Displays the name assigned to the standalone AP.
User	Displays the name of the user logged into the Standalone AP user interface.
Address	Displays the IP address assigned to the standalone AP.
Firmware	Displays the firmware version running on the AP.

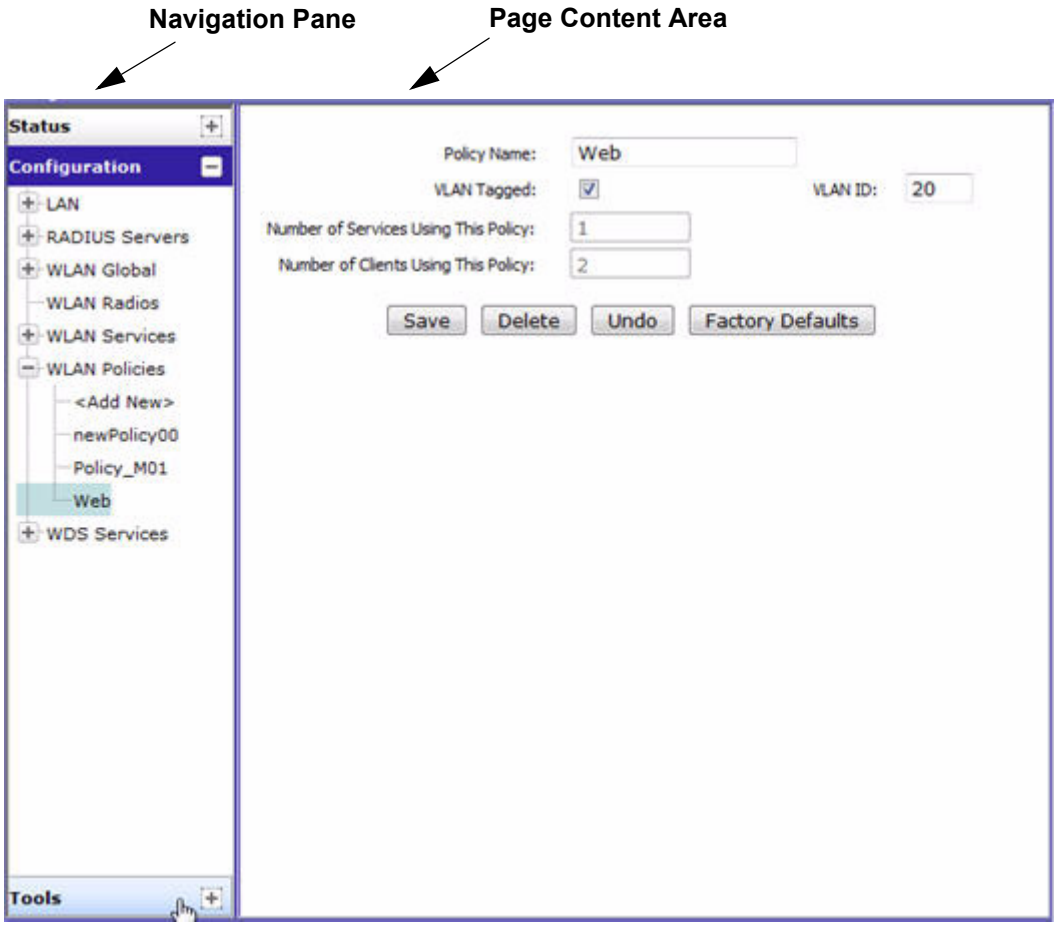
Table 3-2 Contents of the Bottom Banner (continued)

Field/Link	Description
BootROM	Displays the BootROM version of the AP.
WDS uplink	Displays only for child APs that participate in a WDS.

Navigating Through the Standalone AP User Interface

The main user interface window contains both a navigation tree in the left pane and a page content area in the right pane.

Figure 3-4 Navigation Pane and Page Content Area



Using the Navigation Tree

The navigation tree displays in the left pane of the interface. You use the navigation tree to move among folders and pages.

The top level folders in the navigation pane are:

- **Status**

  Expanding the Status link provides a listing of all folders and pages from which you can monitor AP behavior or view AP configuration settings.

- **Configuration**

  Expanding the Configuration link provides a listing of all folders and pages from which you can configure AP behavior and settings.

- **Tools**

  Expanding the Tools link provides a listing of all folders and pages from which you can manage configuration files and users, perform firmware upgrades, and troubleshoot or reboot the AP.

When a plus sign (+) displays next to an item in the navigation tree, that item is not an active link; you must click the plus sign to expand the display. Conversely, you must click the minus sign (-) to collapse the display. The top-level folders (Status, Configuration, and Tools) collapse only when you expand a different top-level folder.

Clicking on an active link produces the following results:

- The active link is highlighted in blue.
- The content of right-hand page refreshes.

You can expand and collapse items in the navigation tree without affecting the page content area displayed in the right pane; the right pane display changes only when you click another active link in the navigation tree.

Note: If you collapse and later expand the section containing the link to the current page displayed in the right pane, the blue highlighting no longer applies to the link. The top UI banner, however, displays the path to the right pane.

Using the Content Page

The content section of each page displays AP information as a form or table. You click a link in the page, or enter information in a field, to perform a task or to move among pages. You can also move among pages by clicking an object in the navigation tree.

Configuring the Standalone AP for the First Time

When the AP powers-up for the first time, for the AP to be operational and able to transfer data, at a minimum you must configure or verify the following settings:

- Password
- IP address
- Firmware version
- At lease one WLAN policy
- At least one WLAN service
- Radios

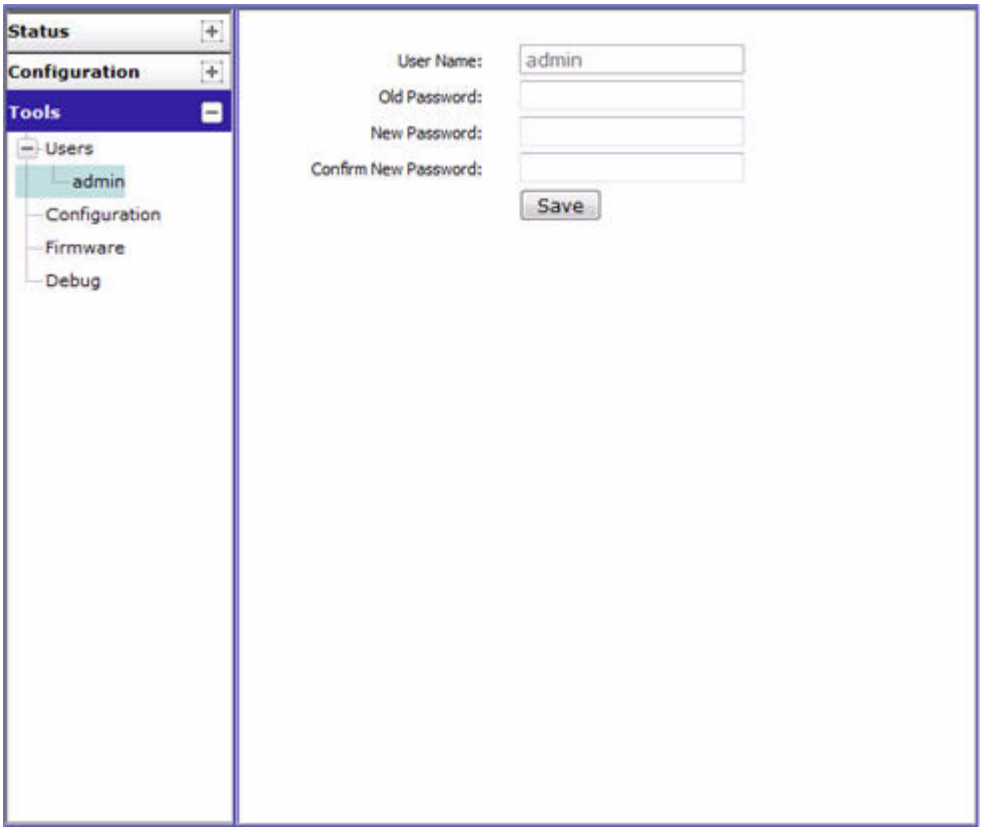
After configuring these settings the AP will have one working WLAN service, will advertise the SSID, and wireless clients should be able to connect to the AP with no encryption.

At a later time you can fine tune the AP's configuration as described in Chapter 4, **Configuring the Enterasys Wireless Standalone 802.11n AP**. The following sections describe the basic configuration settings required for the AP to be fully operational.

Changing the Password

The **admin** account on the standalone AP comes with the factory default password **new2day**. Enterasys Networks recommends changing the password the first time you log on and regularly thereafter.

To display the password settings, navigate to **Tools** > **Users** > **admin**. The user management settings display in the right pane.



Field	Description
User Name	Identifies the user account. The default is **admin**.
Old Password	Enter the password currently in use. The default is **new2day**.
New Password	Enter the new password for the AP. The new password must be between six and thirty-two alphanumeric and special characters, except `'"':\` and the space character. The password is case-sensitive.
Confirm New Password	Re-enter the new password.
Save	Click to save the new password.

To configure the AP password:

1. Enter the following information in the specified fields:
   a. Enter the **Old Password**.
   b. Enter the **New Password**.
   c. Re-enter the new password in the **Confirm New Password** field.
2. Click **Save** to save your changes. The new password entered replaces the previously used password. The software automatically logs you out of the user interface.
3. Log into the user interface using the new password.

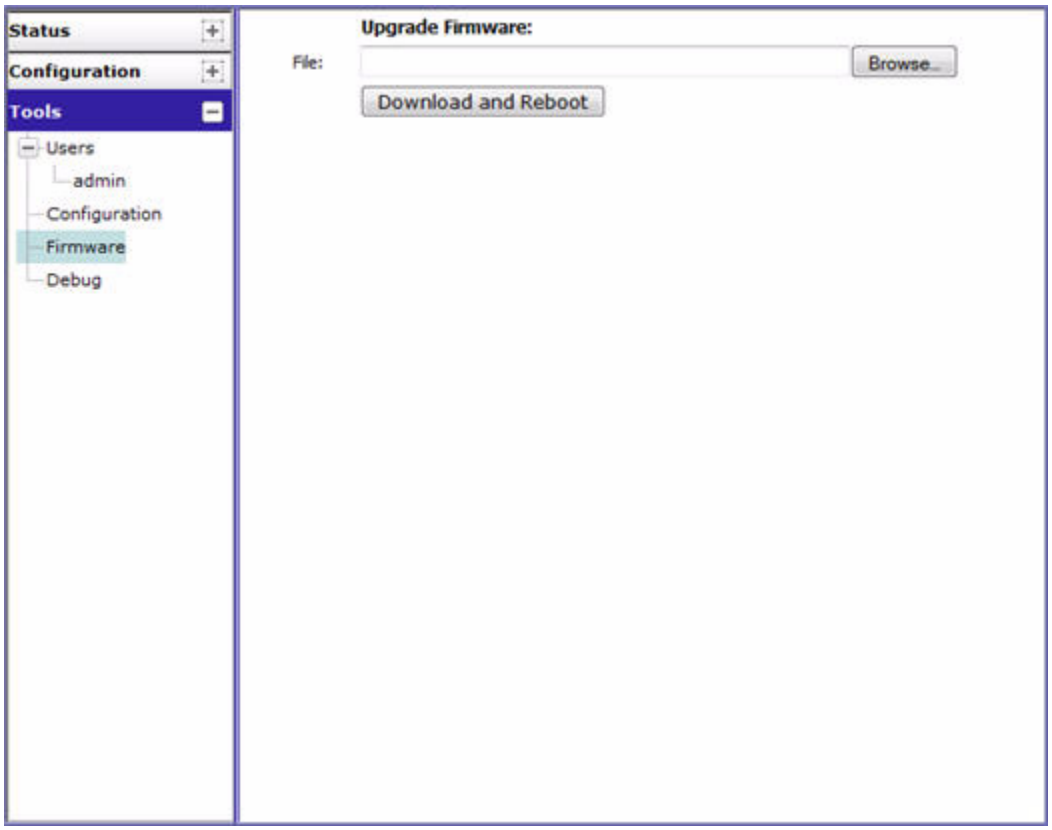
Updating the AP Firmware

The banner at the bottom of the user interface screen identifies the current firmware version running on the AP. Enterasys Networks periodically provides new firmware. You should ensure that the latest firmware version is running on the AP.

To view the latest firmware available, open a web browser and navigate to the firmware and software link of the Enterasys support page at: http://www.enterasys.com/support/. If the support page lists a more recent version of firmware for the AP, you should save the file to your workstation and upgrade to the newest version.

You can upgrade the AP firmware from the Upgrade Firmware page in the Web interface or from the standalone AP CLI. To upgrade the firmware using the CLI, refer to the *Enterasys Wireless Standalone 802.11n AP CLI Reference Guide*.

To display the Upgrade Firmware window in the Web interface, navigate to **Tools** > **Firmware**.



Field	Description
Upgrade Firmware	
File	Enter the filename and location of the firmware image to install or click **Browse** to navigate to the file.
Browse	Click to browse for the location of the firmware file to install.
Download and Reboot	Click to download the firmware image from the location specified in the **File** field. Clicking this button causes the AP to reboot.

To update the AP firmware:

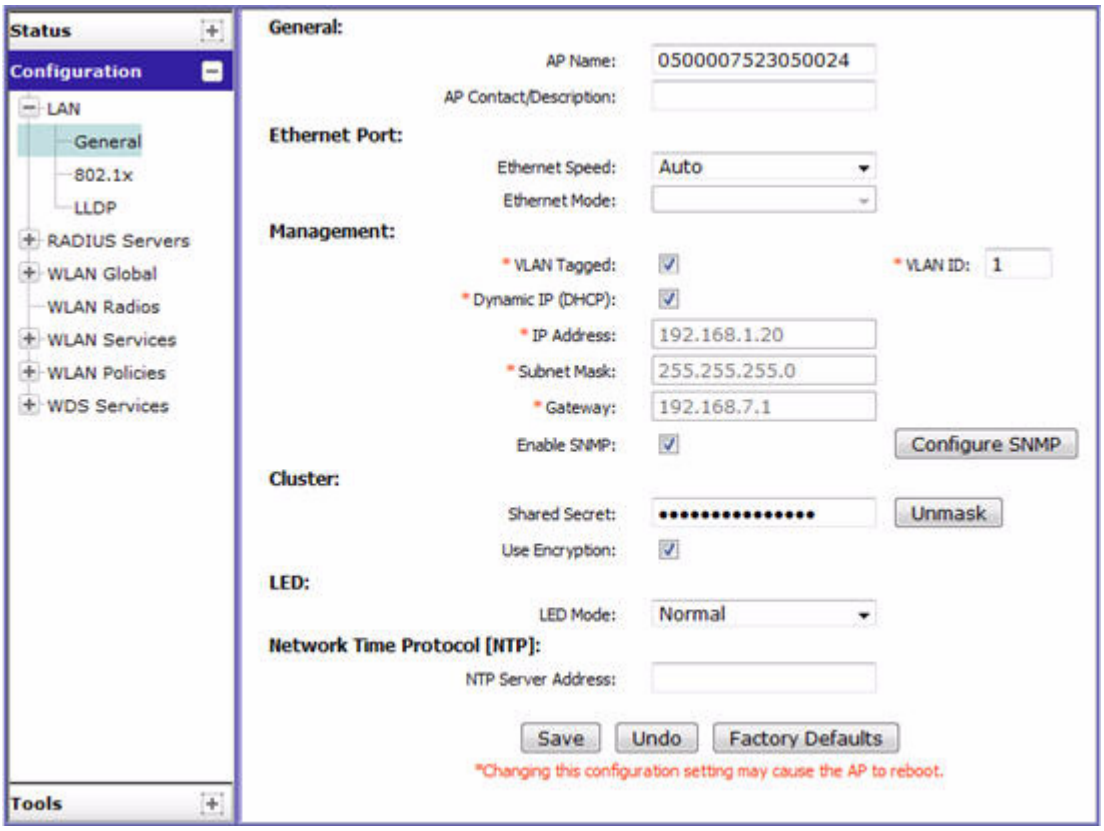
1. Click **Browse** to open a navigation window.
2. Select the firmware file and click **Open**.
3. Click **Download and Reboot**. The AP prompts you that this action will cause the AP to reboot.
4. Click **OK**. The AP reboots to implement the new code.

Configuring the IP Address

By default, DHCP is enabled on the AP and assigns a unique IP address to the AP. If the DHCP server is not available or if you disable DHCP, the AP uses the default IP address (192.168.1.20). If you are using the default IP address, you must change it because only one AP at a time can use the default IP address.

Note: If you are using RADIUS authentication, it is highly recommended that you assign the AP a static IP address to ensure that the address doesn't change via DHCP.

To display the IP address settings, navigate to **Configuration** > **LAN** > **General**. The General LAN configuration settings display in the right pane.



Field	Description
General	
AP Name	Enter a unique name that identifies the AP. The default value is the AP's serial number.
AP Contact/Description	Enter a brief description that helps identify the access point.
Ethernet Port	
Ethernet Speed	Select the **Ethernet Speed** from the drop-down menu. Your options include: • **Auto** (Default) • **10Mbps** • **100Mbps**
Ethernet Mode	Select either **Half-duplex** or **Full-duplex** (default) from the drop-down menu. This drop-down menu is not available when **Ethernet Speed** is set to **Auto**.

Field	Description
Management	
VLAN Tagged	Select to use VLAN tagging. When you enable VLAN tagging, the AP inserts the VLAN ID in the data packet header to identify which VLAN the packet belongs to. If selected, you must enter a value in the **VLAN ID** field. **VLAN Tagged** is disabled by default. **Note:** Changing this setting will cause the AP to reboot.
VLAN ID	If the **VLAN Tagged** checkbox is selected, enter the ID of the VLAN on which the AP will operate. The default value is **1**.
Dynamic IP (DHCP)	Select to enable/deselect to disable DHCP. Select this checkbox for the DHCP server to assign a dynamic IP address to the AP. Deselect to use a static IP address. DHCP is enabled by default. **Note:** Changing this setting will cause the AP to reboot.
IP Address	Enter the static IP address of the AP. The default IP address is **192.168.1.20**. **Note:** Changing this setting will cause the AP to reboot.
Subnet Mask	Enter the subnet mask of the AP. The Subnet Mask is entered in dotted, decimal notation. The default value is **255.255.255.0**. **Note:** Changing this setting will cause the AP to reboot.
Gateway	Enter the default gateway. The default value is **192.168.1.1**. **Note:** Changing this setting will cause the AP to reboot.
Enable SNMP	Select to enable/deselect to disable SNMP communication. When Enable SNMP is selected, the Configure SNMP button displays. SNMP is disabled by default.
Configure SNMP	Click to view and edit SNMP settings. This button is available only when the **Enable SNMP** checkbox is selected.
Cluster	
Shared Secret	Enter the common password that authenticates members of the cluster. The default shared secret is **ThisIsDefaultClusterPassword**.
Unmask	Click to display the value entered in the **Shared Secret** field.
Use Encryption	Select to enable/deselect to disable encryption. When enabled, message exchange between the APs in the cluster is encrypted. When disabled, messages are sent in plain text, which is useful for troubleshooting. Encryption is enabled by default.

Field	Description
LED	
LED Mode	Select the LED Mode from the drop-down menu. You can select one of the following modes: • **Off** — Only displays LED fault patterns. LEDs are off when the AP is fault free and initialization is finished. • **Normal** — (default) LEDs function normally. • **Identify** — All LEDs blink simultaneously. • **WDS Signal Strength** — LEDs are used to indicate the WDS signal strength as a bar-graph (VU-meter). Use this setting only if the AP participates in a WDS. • For more information about the different LED modes, see "LED Behavior" on page A-5.
Network Time Protocol (NTP)	
NTP Server Address	Enter the IP address of the NTP Server. If you do not identify an NTP server, the logs timestamp displays "uptime" for the AP.
Function Buttons	
Save	Click to save your changes.
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

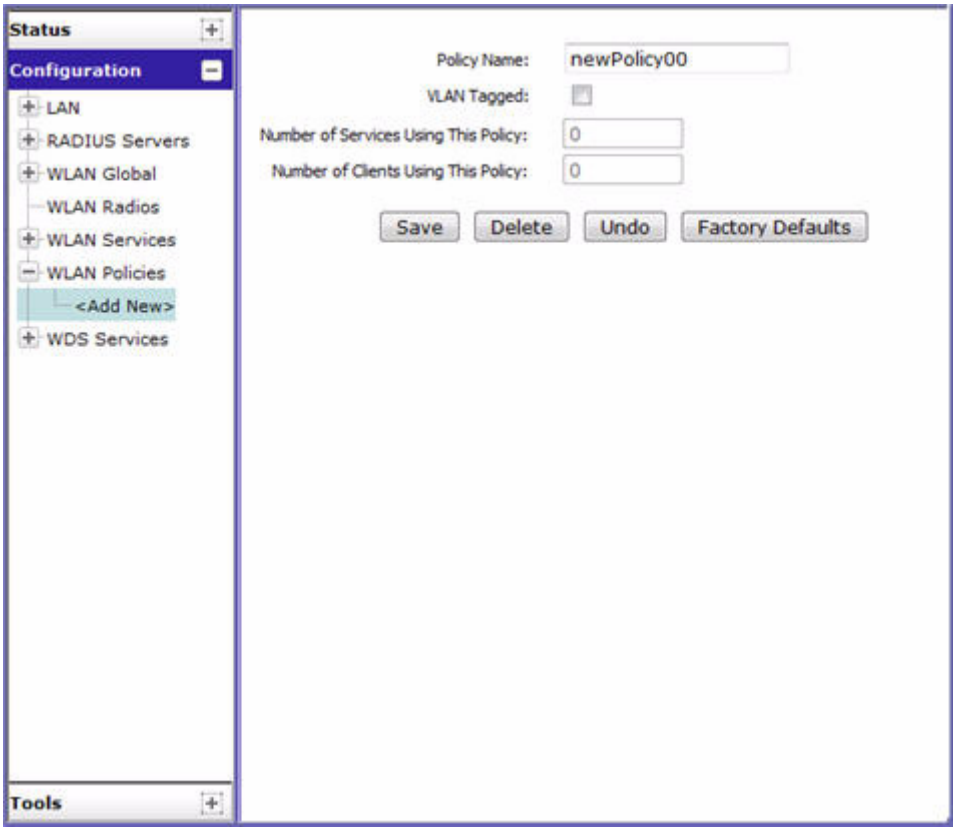
To configure the IP address settings:

1. Locate the settings in the **Management** section of the page.
2. (Optional) Deselect the **Dynamic IP (DHCP)** checkbox to configure a static IP address.
3. Change the **IP Address**.
4. (Optional) Change the **Subnet Mask**.
5. (Optional) Change the **Gateway**.
6. Click **Save** to save your changes.

Creating a WLAN Policy

This section discusses how to set up a WLAN policy. You must create at lease one WLAN policy for the AP to be operational and able to transfer data. Policies are applied through WLAN services. For more information, see "Configuring WLAN Policies" on page 4-28.

To create a new WLAN policy, navigate to **Configuration** > **WLAN Policies**, and select **<Add New>**. The WLAN policy settings display in the right pane.



Field	Description
Policy Name	Enter a name for the policy. The default policy name is **newPolicy00**.
VLAN Tagged	Select to enable/deselect to disable VLAN tagging. When you enable VLAN tagging, the AP inserts the VLAN ID in the data packet header to identify which VLAN the packet belongs to. If selected, you must enter a value in the **VLAN ID** field. **VLAN Tagged** is disabled by default.
VLAN ID	If the **VLAN Tagged** checkbox is selected, enter the ID of the VLAN on which the policy will operate. The default value is **1**.
Number of Services Using This Policy	Displays the number of services currently using this policy.
Number of Clients Using This Policy	Displays the number of clients currently using this policy.
Function Buttons	
Save	Click to save your changes.
Delete	Click to delete the WLAN policy.

Field	Description
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

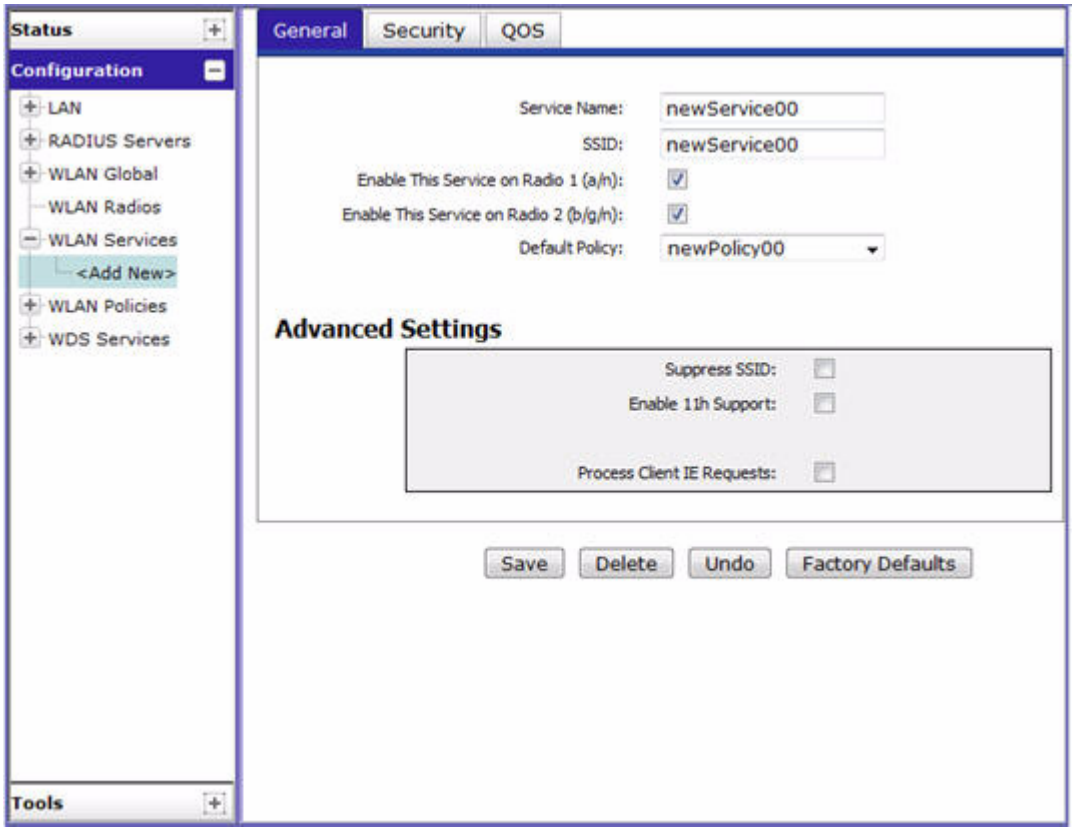
To configure a WLAN policy:

1. Enter a meaningful name for the policy.
2. (Optional) Enable VLAN tagging by selecting the **VLAN Tagged** checkbox and entering the **VLAN ID**.
3. Click **Save** to save your changes.

Creating a WLAN Service

A WLAN service represents all the RF, authentication and QoS attributes of a wireless access service. This section describes how to create a WLAN service and configure basic properties, required for the AP to be operational and able to transfer data. For more information, see "Configuring WLAN Services" on page 4-29.

To create a WLAN service, navigate to **Configuration** > **WLAN Services**, and select **<Add New>**. The General tab of the WLAN services configuration displays in the right pane.



Field	Description
Service Name	Enter the name of the WLAN service. You can change this field only if you are adding a new WLAN service. The default service name is **newService00**.
SSID	Enter the SSID of the WLAN service. The software automatically populates the SSID field with the default service name.
Enable This Service on Radio 1 (a/n)	Select to enable/deselect to disable the WLAN service on Radio 1. The WLAN service is enabled on Radio 1 by default.
Enable This Service on Radio 2 (b/g/n)	Select to enable/deselect to disable the WLAN service on Radio 2. The WLAN service is enabled on Radio 2 by default.
Default Policy	Select a policy as the default for this WLAN service.
Advanced Settings	
Suppress SSID	Select to prevent/deselect to allow this SSID from appearing in the beacon message sent by the AP. The wireless device user seeking network access will not see this SSID as an available choice, and will need to specify it. SSIDs are allowed by default.
Enable 11h Support	Select to enable/deselect to disable TPC (Transmission Power Control) reports. By default this option is disabled. It is recommended to enable this option. 11h support is disabled by default.
Apply Power Reduction to 11h Clients	Select to enable/deselect to disable the AP to use reduced power (as does the 11h client). By default this option is disabled. It is recommended to enable this option. Power reduction to 11h clients is disabled by default.
Process Client IE Requests	Select to enable/deselect to disable the AP to accept IE requests sent by clients via Probe Request frames and responds by including the requested IE's in the corresponding Probe Response frames. By default this option is disabled. It is recommended to enable this option.
Function Buttons	
Save	Click to save your changes.
Delete	Click to delete the WLAN service.
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

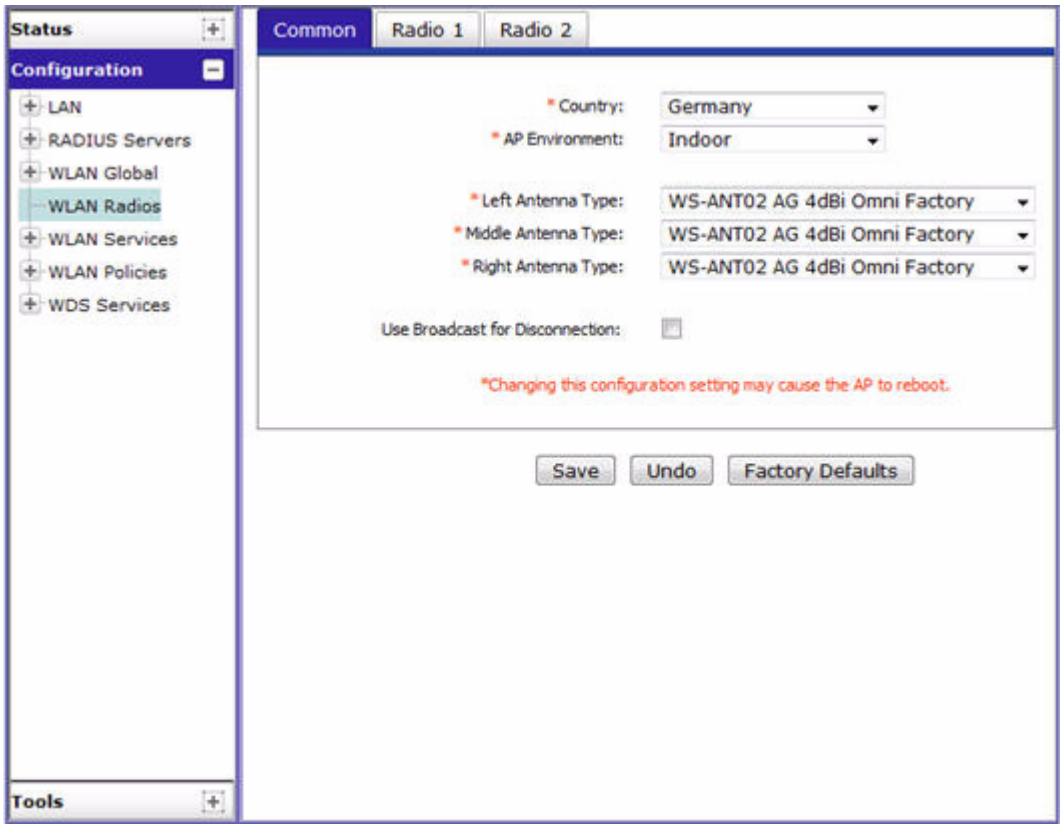
To configure the General properties of a WLAN service:

1. (Optional) Change the **Service Name**.
2. (Optional) Change the **SSID** or leave the default.
3. Select at least one radio to enable this service on.
4. Select the **Default Policy**.
5. Click Save to save your changes.

Configuring the Radios

You are required to configure very few radio settings for basic operation, such as the country of operation, identifying installed external antennas (AP3640 only), and the radio modes for Radio 1 and Radio 2. The default settings for each radio are sufficient to enable the AP to be operational.

To display the WLAN Radios configuration, navigate to **Configuration** > **WLAN Radios**. The Common radio tab displays in the right pane.



To configure the radio properties required for basic operation:

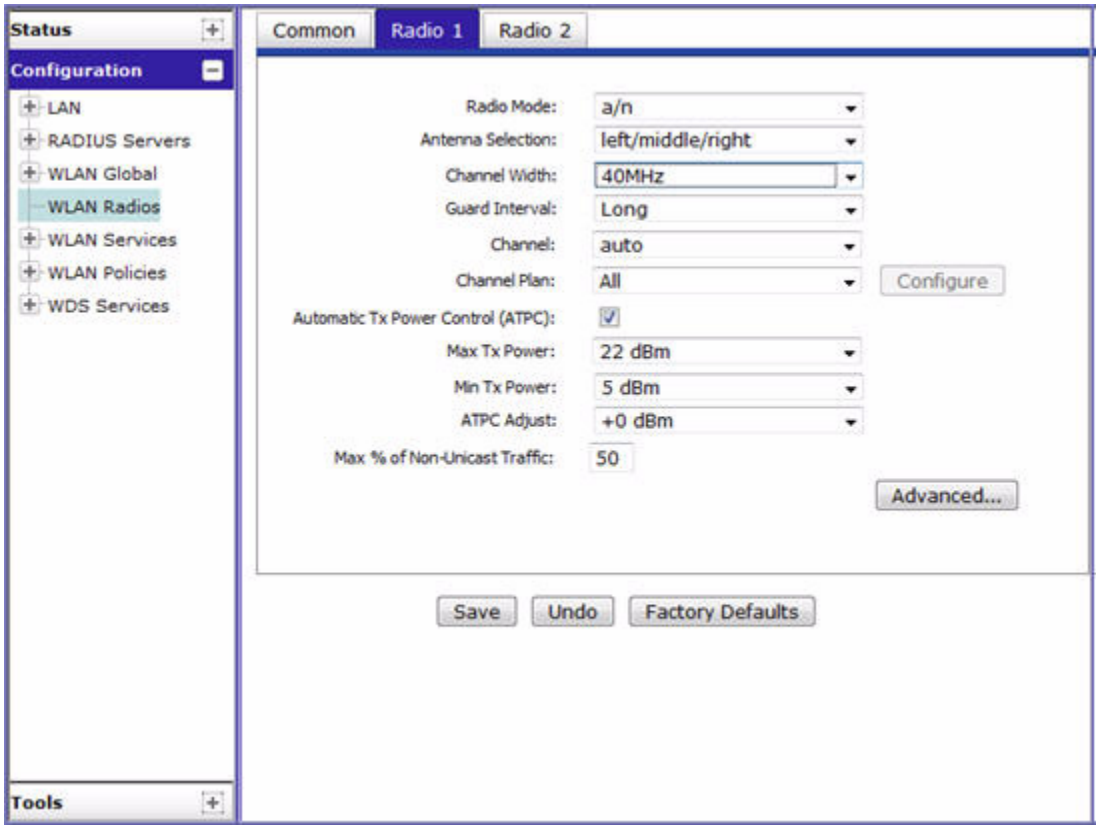
1. Select the correct country of operation.
2. Select the name of the actual antenna connected to the AP from each **Antenna Type** drop-down menu (AP3640 only).

Caution: Selecting the wrong antenna may cause permanent damage to the AP.

Note: The antenna you select determines the available channel list and the maximum transmitting power for the country in which the AP is deployed.

3. Click **Save** to save your changes.

4. Select the **Radio 1** tab. The settings for **Radio 1** display.



5. Select the **Radio Mode**.
6. Click **Save** to save your changes.
7. Select the **Radio 2** tab and repeat Step 5 and Step 6.

For more detailed information about radio configuration, go to "Radio and Antenna Configuration" on page 4-15.

4

Configuring the Enterasys Wireless Standalone 802.11n AP

This chapter discusses the configuration process for the Enterasys Wireless Standalone 802.11n AP in the following sections:

For information about...	Refer to page...
Configuring the LAN Settings	4-1
Configuring RADIUS Authentication	4-10
WLAN Global Configuration	4-11
Radio and Antenna Configuration	4-15
Configuring WLAN Policies	4-28
Configuring WLAN Services	4-29

Configuring the LAN Settings

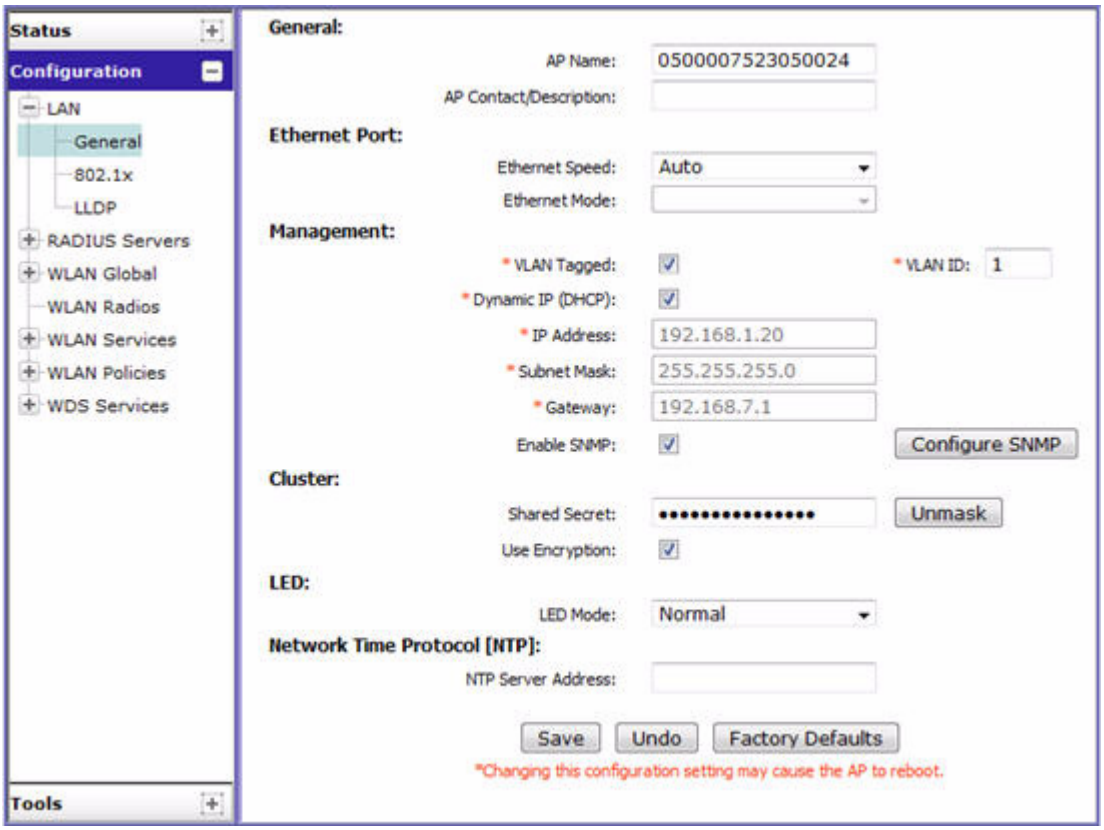
This section discusses the Local Area Network (LAN) configuration, in the following three topics:

For information about...	Refer to page...
Configuring General LAN Settings	4-2
Configuring 802.1X Authentication	4-6
Configuring LLDP	4-8

Configuring General LAN Settings

General LAN parameters that can be set include the AP's name, Ethernet speed, IP address, VLAN association, LED mode, NTP address, and SNMP options.

To display the general LAN settings, navigate to **Configuration** > **LAN** > **General**. The general LAN configuration displays in the right pane.



Field	Description
General	
AP Name	Enter a unique name that identifies the AP. The default value is the AP's serial number.
AP Contact/Description	Enter a brief description that helps identify the access point.
Ethernet Port	
Ethernet Speed	Select the **Ethernet Speed** from the drop-down menu. Your options include: • **Auto** (Default) • **10Mbps** • **100Mbps**
Ethernet Mode	Select either **Half-duplex** or **Full-duplex** (default) from the drop-down menu. This drop-down menu is not available when **Ethernet Speed** is set to **Auto**.

Field	Description
Management	
VLAN Tagged	Select to use VLAN tagging. When you enable VLAN tagging, the AP inserts the VLAN ID in the data packet header to identify which VLAN the packet belongs to. If selected, you must enter a value in the **VLAN ID** field. **VLAN Tagged** is disabled by default. **Note:** Changing this setting will cause the AP to reboot.
VLAN ID	If the **VLAN Tagged** checkbox is selected, enter the ID of the VLAN on which the AP will operate. The default value is **1**.
Dynamic IP (DHCP)	Select to enable/deselect to disable DHCP. Select this checkbox for the DHCP server to assign a dynamic IP address to the AP. Deselect to use a static IP address. DHCP is enabled by default. **Note:** Changing this setting will cause the AP to reboot.
IP Address	Enter the static IP address of the AP. The default IP address is **192.168.1.20**. **Note:** Changing this setting will cause the AP to reboot.
Subnet Mask	Enter the subnet mask of the AP. The Subnet Mask is entered in dotted, decimal notation. The default value is **255.255.255.0**. **Note:** Changing this setting will cause the AP to reboot.
Gateway	Enter the default gateway. The default value is **192.168.1.1**. **Note:** Changing this setting will cause the AP to reboot.
Enable SNMP	Select the Enable SNMP checkbox to enable SNMP communication. When Enable SNMP is selected, the Configure SNMP button displays. SNMP is disabled by default.
Configure SNMP	Click to view and edit SNMP settings. This button is available only when the **Enable SNMP** checkbox is selected.
Cluster	
Shared Secret	Enter the common password that authenticates members of the cluster. The default shared secret is **ThisIsDefaultClusterPassword**.
Unmask	Click to display the value entered in the **Shared Secret** field.
Use Encryption	Select to enable/deselect to disable encryption. When enabled, message exchange between the APs in the cluster is encrypted. When disabled, messages are sent in plain text, which is useful for troubleshooting. Encryption is enabled by default.
LED	
LED Mode	Select the LED Mode from the drop-down menu. You can select one of the following modes: • **Off** — Only displays LED fault patterns. LEDs are off when the AP is fault free and initialization is finished. • **Normal** — (default) LEDs function normally. • **Identify** — All LEDs blink simultaneously. • **WDS Signal Strength** — LEDs are used to indicate the WDS signal strength as a bar-graph (VU-meter). Use this setting only if the AP participates in a WDS. • For more information about the different LED modes, see “LED Behavior” on page A-5.

Field	Description
Network Time Protocol (NTP)	
NTP Server Address	Enter the IP address of the NTP Server. If you do not identify an NTP server, the logs timestamp displays “uptime” for the AP.
Function Buttons	
Save	Click to save your changes.
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

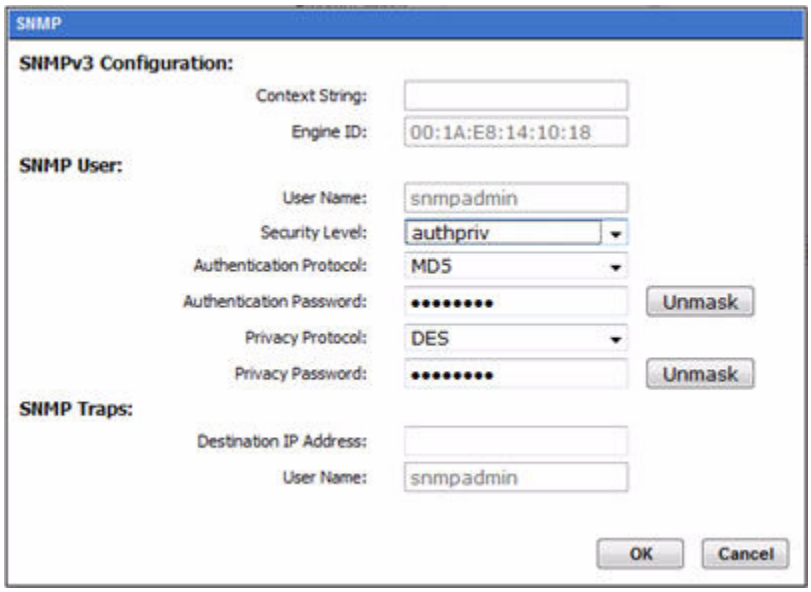
To configure the General LAN settings:

1. (Optional) Change the **AP Name** and add a description.
2. (Optional) Change the **Ethernet Speed** from **auto** to a manual speed, then select the **Ethernet Mode.**
3. (Optional) Select the **VLAN Tagged** checkbox to enable VLAN tagging and enter the **VLAN ID**.
4. If you have not done so already, configure DHCP or IP address properties. For more information about configuring DHCP or IP address properties, see “Configuring the IP Address” on page 3-12.
5. (Optional) Select the **Enable SNMP** checkbox to enable SNMP. See Configuring SNMP (below) for information about how to configure SNMP.
6. (Optional) Enter the **Shared Secret** if the AP participates in a Cluster. Click **Unmask** to view the **Shared Secret**.
7. (Optional) Select the **Use Encryption** checkbox.
8. (Optional) Select the **LED Mode**.
9. (Optional) Enter the **NTP Server Address**.
10. Click **Save**. A dialog notifies you the configuration change will cause the AP to reboot.
11. Click **OK**. The AP saves your changes and reboots.

Configuring SNMP

The AP includes an on-board agent that supports SNMPv3. You can use a network management application such as Enterasys Networks NetSight Console to manage the AP via SNMP from a network management station. For information about traps and MIBs supported by the AP, see Appendix B, **SNMP Traps and MIBs**.

To display the SNMP settings, navigate to **Configuration** > **LAN** > **General**. Select the **Enable SNMP** checkbox, then click **Configure SNMP**. The SNMP configuration dialog displays.



Field	Description
SNMPv3 Configuration	
Context String	Displays the SNMP context string used to identify this AP to an SNMP client. This field is read-only and defaults to an empty string.
Engine ID:	Displays the AP's MAC address. This field is read-only.
SNMP User	
User Name	Displays the user name. This field is read-only and defaults to **snmpadmin**.
Security Level	Select the desired level of security. The **Security Level** options include: • Select **authpriv** (default) to use authentication and data encryption. Users assigned to this group send SNMP messages that use a password for authentication and a privacy key for encryption. If you select **authpriv**, you must also define the Authentication Protocol and Privacy Protocol. • Select **authnopriv** to use authentication, but no data encryption. Users assigned to this group send SNMP messages that use a password for authentication, but not a privacy key for encryption. • Select **noauthnopriv** to use no authentication and no data encryption. Users assigned to this group use no security in SNMP messages they send to the agent.
Authentication Protocol	Select the authentication method. Select either: • **MD5** (default) • **SHA** This drop-down menu is only available if you chose **authpriv** or **authnopriv** from the **Security Level** drop-down menu.

Field	Description
Authentication Password	Enter a privacy key for encryption. The key must be between 8 and 32 characters. The default password is **password**.
Unmask	Click to display the value entered in the **Authentication Password** field.
Privacy Protocol	Select the encryption type from the drop-down menu. Select either: • **DES** (default). A DES encryption key is 56 bits long. • **AES.** An AES encryption key is 128 bits long. AES provides high-security encryption.
Privacy Password	Enter a privacy key for encryption. The key must be between 8 and 32 characters. The default password is **password**.
Unmask	Click to display the value entered in the **Privacy Password** field.
SNMP Traps	
Destination IP Address	Enter the IP address of the SNMPv3 trap destination. A maximum of one trap destination can be configured.
User Name	Displays the user name associated with SNMP traps. This field is read-only and defaults to **snmpadmin**.
Function Buttons	
Close	Click to save the SNMP configuration and close the SNMP configuration window.

To configure SNMP:

1. Select a **Security Level** from the drop-down menu.
2. If you select **authpriv** or **authnopriv** as your security level,
   a. Select the **Authentication Protocol**.
   b. Enter the **Authentication Password**. Click **Unmask** to view and proofread your entry.
3. If using **authpriv** as your security level:
   a. Select the **Privacy Protocol** from the drop-down menu.
   b. Enter the **Privacy Password**. Click **Unmask** to view your entry.
4. Enter the **Destination IP Address**.
5. Click **Save** to save your changes.

Configuring 802.1X Authentication

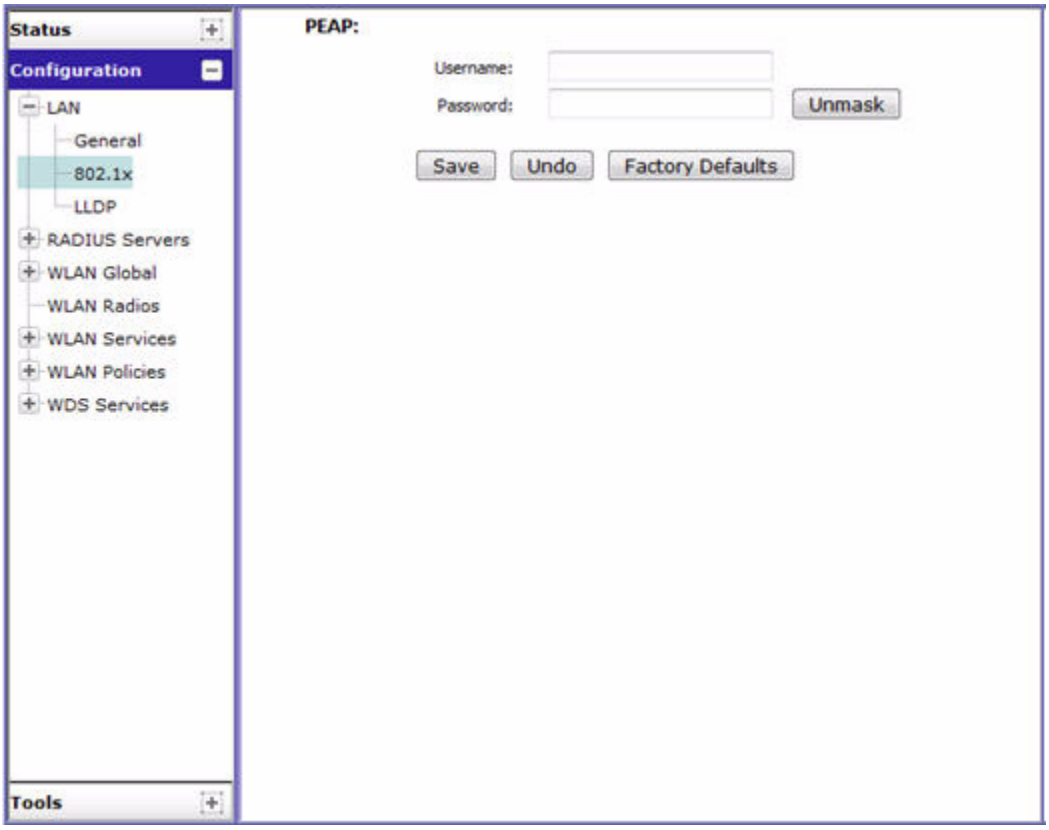
This section discusses 802.1x authentication using PEAP.

802.1x is an authentication standard for wired and wireless LANs. The 802.1x standard can be used to authenticate access points to the LAN to which they are connected. 802.1x support provides security for network deployments where access points are placed in public spaces. The AP supports the Protected Extensible Authentication Protocol (PEAP) for 802.1x authentication.

Notes:

- You must configure the AP for 802.1x authentication before the AP is connected to an 802.1x enabled switch port.
- If the switch port to which the AP is connected to is not 802.1x enabled, the 802.1x authentication will not take effect.

To display 802.1x PEAP authentication settings, navigate to **Configuration** > **LAN** > **802.1x**. The LAN **802.1x** configuration displays in the right pane.



Field	Description
Username	Enter the value you want to assign as the user name credential. Limit is 128 characters. Alphanumeric and special characters are supported.
Password	Enter the value you want to assign as the password credential. Limit is 128 characters. Alphanumeric and special characters are supported.
Unmask	Click to display the value entered in the **Password** field.
Function Buttons	
Save	Click to save your changes.
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

To configure 802.1x PEAP authentication:

1. Enter the **Username** and **Password**.
2. Click **Unmask** to view and proofread the entry in the **Password** field.
3. Click **Save** to save your changes.

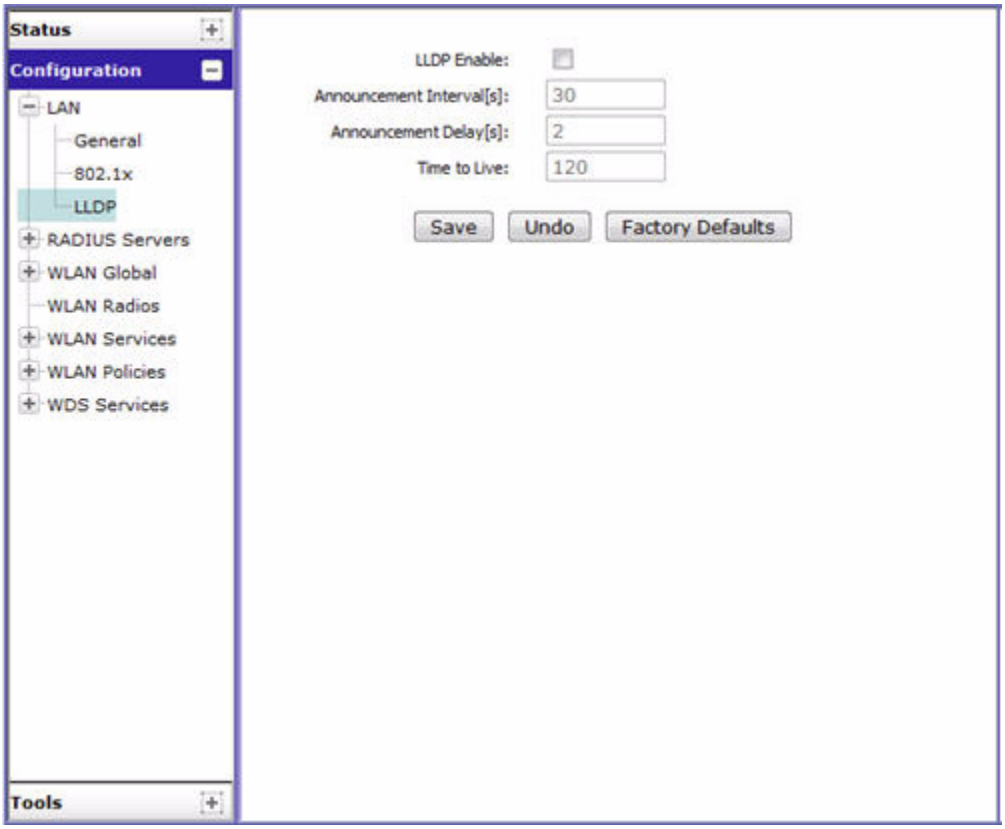
Configuring LLDP

This section discusses how to configure LLDP.

LLDP is a protocol that allows a network device to broadcast its information on a local network to other network devices. This information is transmitted according to the protocol's TLVs (Type-Length-Value) elements in an LLDP packet. APs advertise a combination of standard LLDP protocol elements and specific Enterasys information.

When you enable LLDP on the AP, you must also define the **Announcement Interval**, **Announcement Delay**, and **Time to Live**.

To display the LLDP settings, navigate to **Configuration** > **LAN** > **LLDP**. The LAN LLDP configuration displays in the right pane.



Field	Description
LLDP Enable	Select to enable or disable the AP from broadcasting LLDP information. LLDP is disabled by default.
Announcement Interval[s]	Enter the time (in seconds) between successive LLDP packets that the AP advertises. If changes to the AP's configuration do not impact the LLDP information, the AP sends a new LLDP packet according to this announcement interval setting. You can enter an interval between 5 and 32,768 seconds. The default interval is **30**.
Announcement Delay[s]	The length of time (in seconds) that new packet delivery is delayed. If a change to the AP configuration occurs which impacts the LLDP information, the AP sends an updated LLDP packet. The announcement delay is the length of time that delays the new packet delivery. The delay provides an opportunity for any other potential configuration changes to be included in the same packet delivery. The announcement delay helps minimize LLDP packet traffic. Set the Announcement Delay to a value up to 1/4 the value of the Announcement Interval. For example, if the Announcement Interval is set to 32,768, you can set the Announcement Delay up to 8192. The default delay is **2**.
Time to Live	Displays how long (in seconds) the receiving device considers the previously sent information packet to be accurate. The **Time to Live** value is sent in each LLDP packet. The receiving LLDP device retains the information from the LLDP packet for the duration of the Time to Live value. If no other LLDP packets arrive after that period, the information is considered stale and then discarded. The AP software calculates Time to Live value as four times the Announcement Interval value.
Function Buttons	
Save	Click to save your changes.
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

To enable and configure LLDP:

1. Select the **LLDP Enable** checkbox. The **Announcement Interval(s)** and **Announcement Delay(s)** fields are read-only until the **LLDP Enable** checkbox is selected.
2. (Optional) Change the **Announcement Interval(s)**.
3. (Optional) Change the **Announcement Delay(s)**.

Note: The **Time to Live** value cannot be directly edited. The Time to Live value is calculated as four times the Announcement Interval value.

4. Click **Save** to save your changes.

Configuring RADIUS Authentication

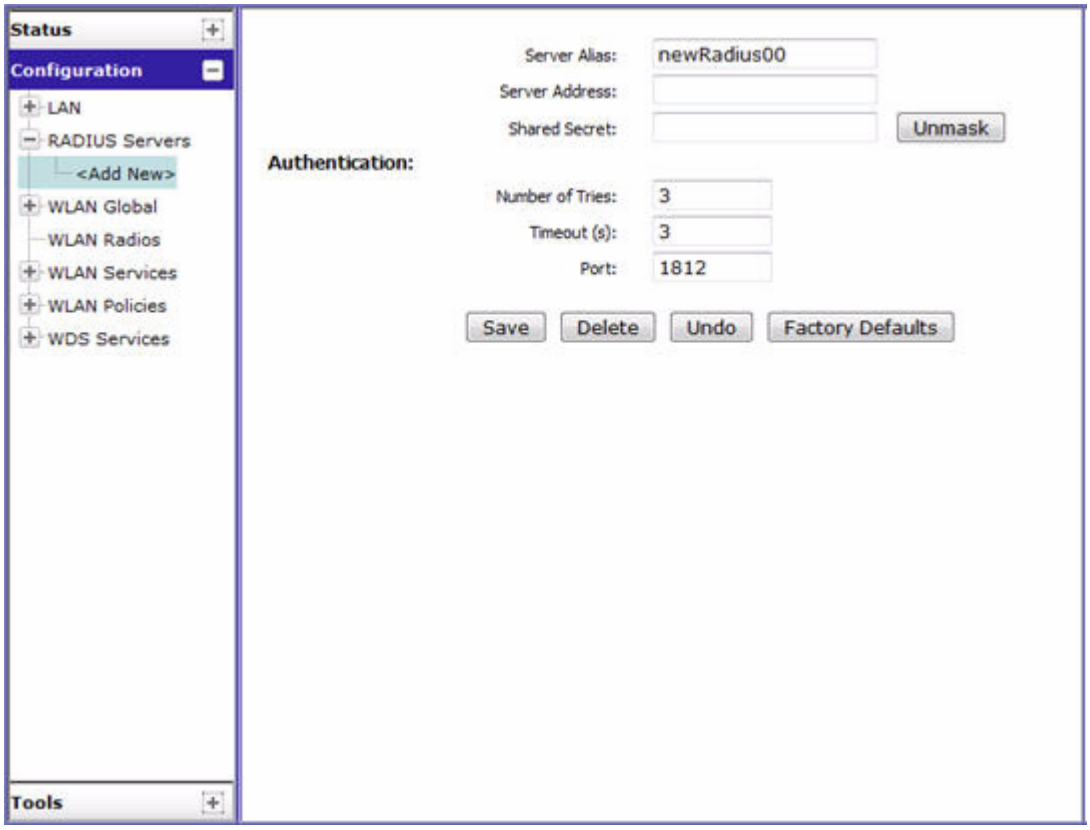
If you plan to use a RADIUS server to authenticate wireless clients, you must identify the RADIUS server to the AP. A RADIUS server must be specified for some WLAN service security options. This section discusses how to configure the AP to use RADIUS servers for authentication.

The AP supports up to two RADIUS servers that are shared by all WLAN services (SSIDs) — a primary and secondary (for redundancy). You can configure the retry parameters for the RADIUS server. The RADIUS client supports 802.11v1/2 authentication.

Notes:

- This guide assumes that you already configured RADIUS server(s) to support the access point. Configuration of RADIUS server software is beyond the scope of this guide. Refer to the documentation provided with the RADIUS server software.
- If you are using RADIUS, it is highly recommended that you assign the AP a static IP address to ensure that the address doesn't change via DHCP.

To display the RADIUS server configuration, navigate to **Configuration** > **RADIUS Servers**, and select the RADIUS server you want to edit or select **<Add New>** to configure a new RADIUS server.The RADIUS Servers configuration displays in the right pane.



Field	Description
Server Alias	Enter a name that you want to assign to the RADIUS server. The default server alias is **newRadius00**.
Server Address	Enter the IP address of the RADIUS server.
Shared Secret	Enter the password used to validate the connection between the AP and the RADIUS server.

Field	Description
Unmask	Click to display the value entered in the **Shared Secret** field.
Authentication	
Number of Tries	Enter number of times (1-10) the AP tries to contact the RADIUS server. The default number of tries is **3**.
Timeout (s)	Enter the timeout, in seconds (1-10 seconds) for retries. The default timeout is **3** seconds.
Port	Enter the port number on the RADIUS server that the AP should use when sending its RADIUS request messages. The value can range from 1024 to 65535. The default port number is **1812**.
Function Buttons	
Save	Click to save your changes.
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

To configure RADIUS server for authentication:

1. (Optional) Change the **Server Alias**.
2. Enter the **Server Address** and **Shared Secret.** Click **Unmask** to view and proofread the **Shared Secret**.
3. (Optional) Change the **Number of Tries**, **Timeout (s)**, and/or **Port**.
4. Click **Save** to save your changes.

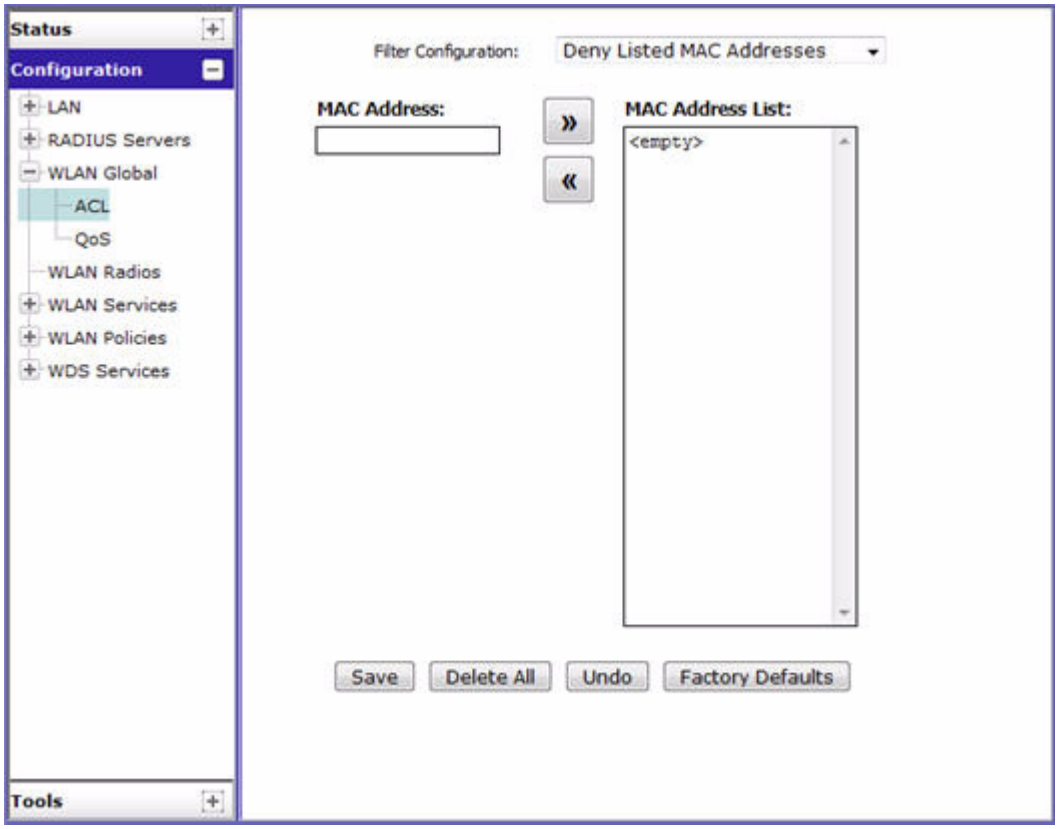
WLAN Global Configuration

This section discusses the WLAN global configuration process, including how to create an ACL and global QoS settings.

Creating an Access Control List

The Access Control List (ACL) option allows you to filter access to clients based on their MAC address. You can enter multiple MAC addresses into the list and choose to either deny or allow access to the MAC addresses listed.

To display the access control list, navigate to **Configuration** > **WLAN Global** > **ACL**. The ACL configuration displays in the right pane.



Field	Description
Filter Configuration	Select the MAC address filter method: • **Deny Listed MAC addresses** (default) — The entries listed in the MAC address list are denied access. • **Allow Only Listed MAC Addresses** — The entries listed in the MAC address list are the only clients allowed access. • **Disable MAC Address Filtering** — Filtering by MAC address is disabled.
MAC Address	Enter a valid MAC address to filter on.
MAC Address List	Displays the list of MAC addresses applied to the filter. The MAC Address list is limited to 768 entries.
Function Buttons	
Save	Click to save your changes.
Delete All	Click to delete all the MAC addresses in the **MAC Address List**.
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

To configure an access control list:

1. Select the **Filter Configuration**.
2. Enter a valid **MAC Address**. If the MAC address is valid, the Right Arrow button activates.
3. Click the Right Arrow button to move the MAC address in the **MAC Address** field to the **MAC Address List**.
4. Repeat step 2 and step 3 to add additional MAC addresses to the **MAC Address List**.
5. To remove a MAC address from the **MAC Address List**, select the MAC address in the **MAC Address List** and click the Left Arrow button.
6. Click **Save** to save your changes.

Configuring QoS

The WLAN Global QoS settings include configuration for **Flexible Client Access** and **Admission Control Thresholds**.

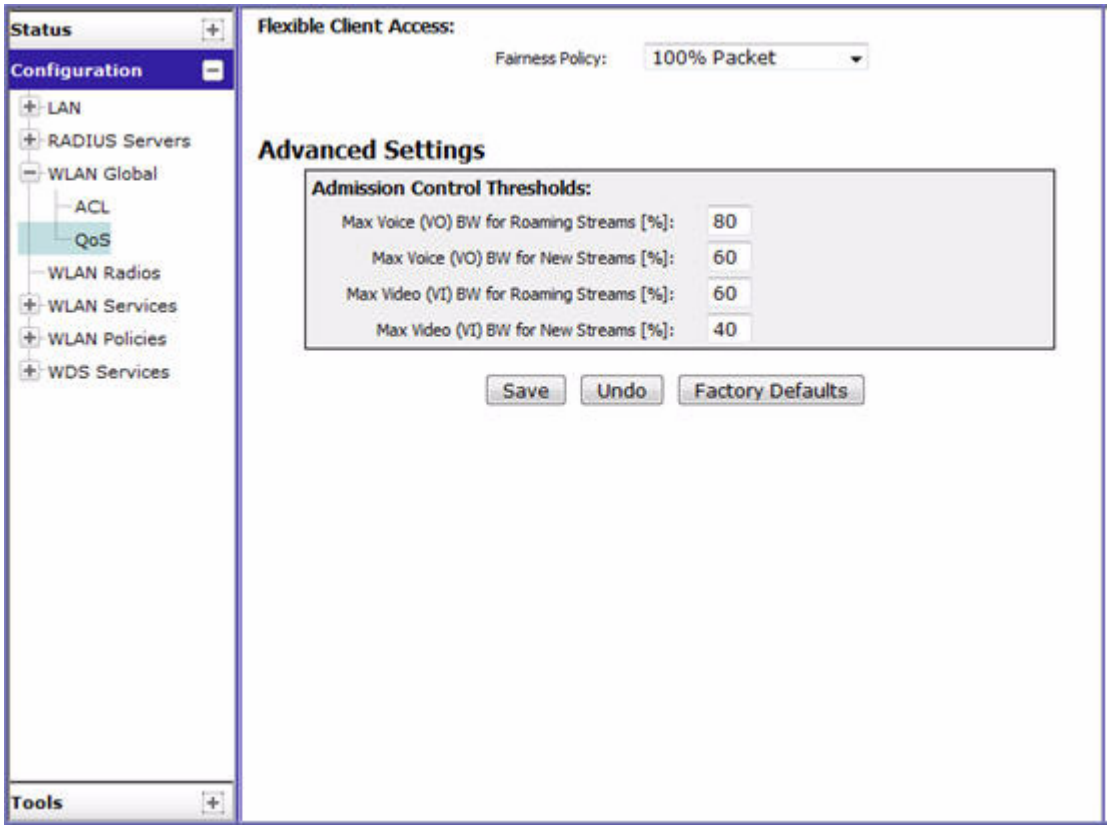
Flexible Client Access provides the ability to adjust media access fairness in five levels between packet fairness and airtime fairness.

- Packet fairness is the default 802.11 access policy. Each WLAN participant gets the same (equal) opportunity to send packets. All WLAN clients will show the same throughput, regardless of their PHY rate.
- Airtime fairness gives each WLAN participant the same (equal) time access. WLAN clients' throughput will be proportional to their PHY rate.

Admission control thresholds protect admitted traffic against overloads, provide distinct thresholds for VO (voice) and VI (video), and distinct thresholds for roaming and new streams.

These global QoS settings apply to all APs that serve QoS enabled WLAN services with admission control.

To display WLAN Global QoS settings, navigate to **Configuration** > **WLAN Global** > **QoS**. The QoS configuration displays in the right pane.



Field	Description
Flexible Client Access	
Fairness Policy	Select a policy from the drop-down menu. Choices range from 100% packet fairness to 100% airtime fairness. The default fairness policy is **100% Packet.**
Advanced Settings: **Admission Control Thresholds**	
Max Voice (VO) BW for Roaming Streams (%)	Enter the maximum overall bandwidth percentage (1-100%) allowed on an AP when a client with an active voice stream roams to a new AP and requests admission for the voice stream. The default value is **80**.
Max Voice (VO) BW for new Streams (%)	Enter the maximum overall bandwidth percentage (1-100)% allowed on an AP when an already associated client requests admission for a new voice stream. The default value is **60**.
Max Video (VI) BW for Roaming Streams (%)	Enter the maximum overall bandwidth percentage (1-100%) allowed on the new AP when a client with an active video stream roams to a new AP and requests admission for the video stream. The default value is **60**.
Max Video (VI) BW for new Streams (%)	Enter the maximum overall bandwidth percentage (1-100%) allowed on an AP when an already associated client requests admission for a new video stream. The default value is **40**.

Field	Description
Function Buttons	
Save	Click to save your changes.
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

To configure WLAN Global QoS settings:

1. (Optional) In the Flexible Client Access area, change the **Fairness Policy**.
2. (Optional) In the **Advanced Settings** section, change the **Admission Control Thresholds**.
3. Click **Save** to save your changes.

Radio and Antenna Configuration

This section discusses the radio configuration, including settings shared by both radios and individual radio settings. This section also discusses antenna selection.

The AP is equipped with two radios:

- **Radio 1—**5 GHz radio supporting the 802.11a/n standard — When in legacy 802.11a mode, the AP supports data rates up to 54Mbps. The modulation used is OFDM.

  In 802.11n mode there are 2 supported channel bandwidths, 20MHz and 40MHz. The AP supports up to 300Mbps in 40MHz channels and 130Mbps in 20MHz channels. The modulation used is MIMO-OFDM with one or two spatial streams.

- **Radio 2—**2.4 GHz radio supporting the 802.11b/g/n standard — When in legacy 802.11b/g mode, the AP supports data rates up to 54Mbps. The modulation used is OFDM for 11g and CCK for 11b.

  In 802.11n mode there are 2 supported channel bandwidths, 20MHz and 40MHz. The AP supports up to 300Mbps in 40MHz channels and 130Mbps in 20MHz channels. The modulation used is MIMO-OFDM with one or two spatial streams.

Figure 4-1 is a block diagram of the AP equipped with external antennas.

Figure 4-1 Enterasys Wireless Standalone 802.11n AP Baseband

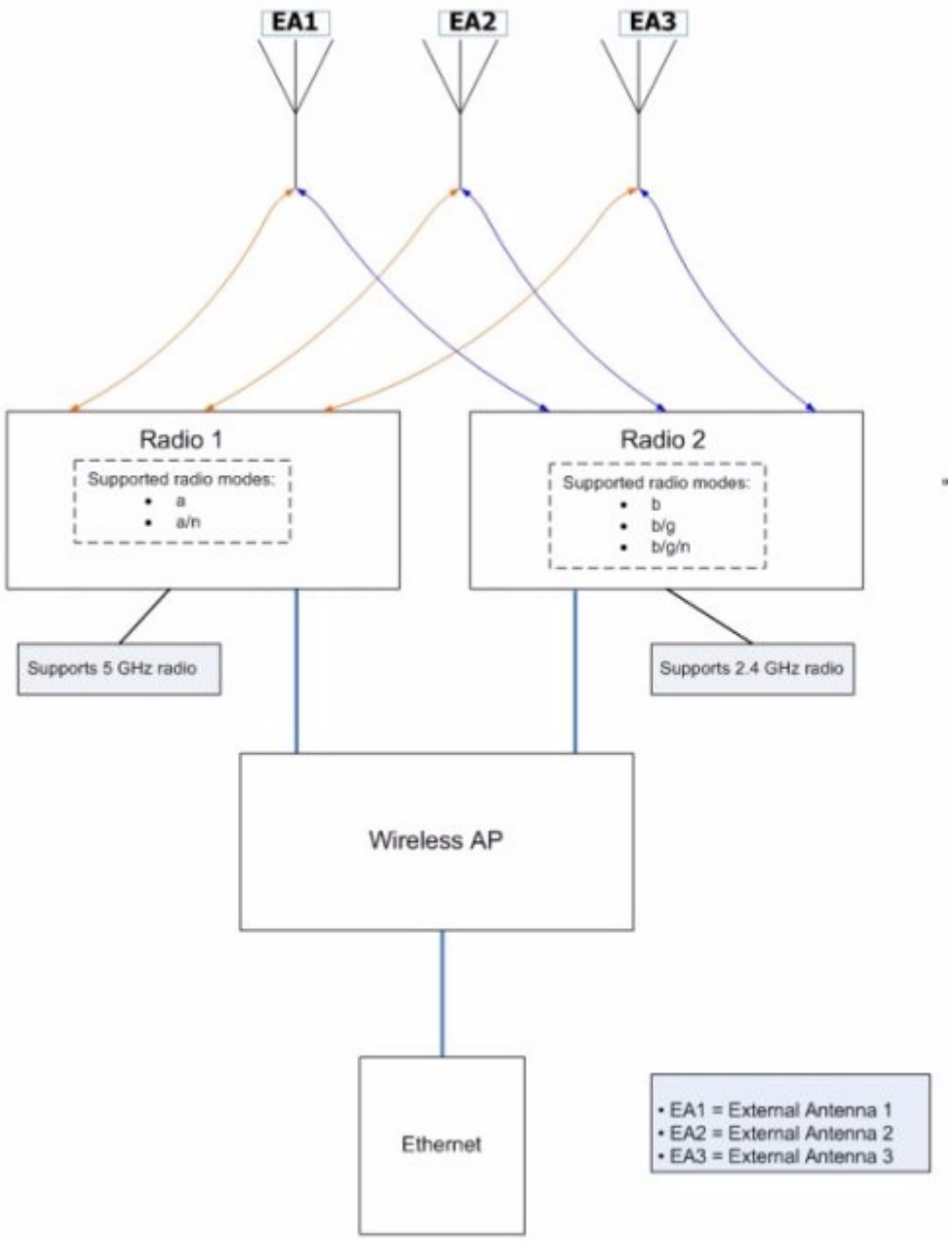


Figure 4-1 illustrates the following:

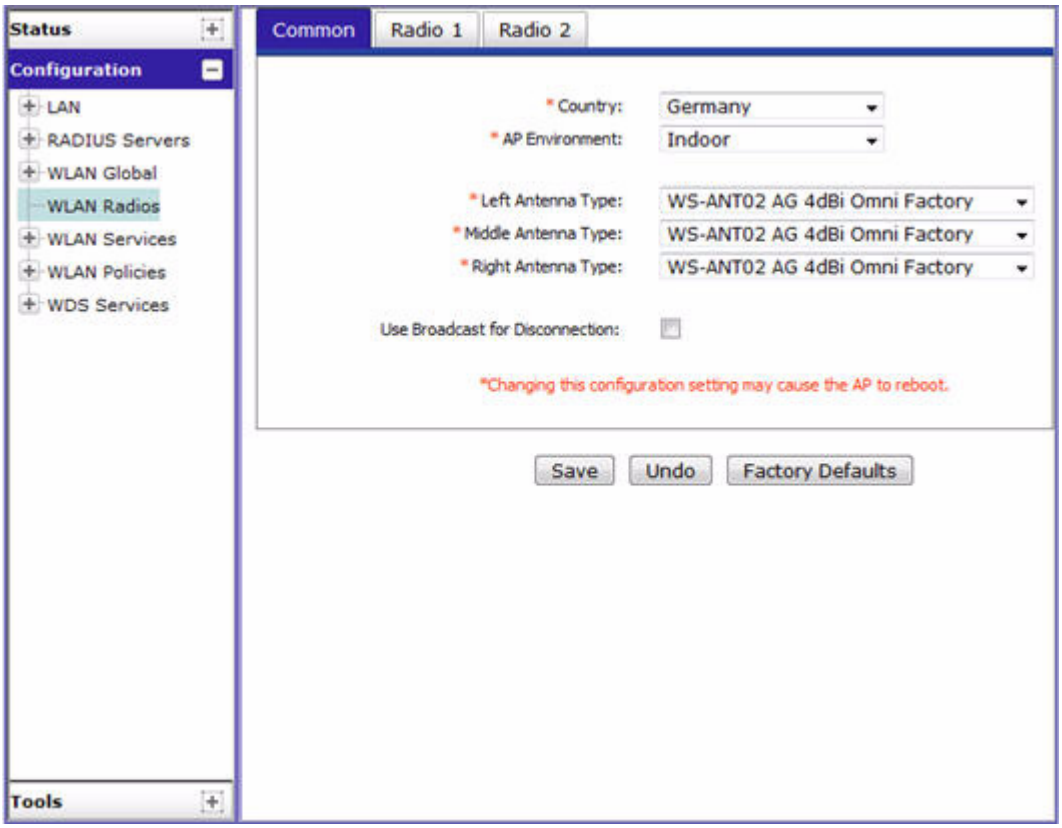
- The AP has two radios — **Radio 1** and **Radio 2**.
- **Radio 1** supports the 5 GHz radio, with radio modes **a** and **a/n**.
- **Radio 2** supports the 2.4 GHz radio, with radio modes **b**, **b/g**, and **b/g/n**.
- **Radio 1** and **Radio 2** are connected to all three antennas — EA1, EA2, and EA3.

Configuring Common Radio Properties

This section describes how to configure radio properties that are shared by both radios, such as the country of operation, AP environment, and antenna types.

Note: If this AP is a WDS parent AP, the settings on the WLAN Radios Common tab are read-only to prevent child APs from losing their connection.

To display the common properties shared by both of AP radios, navigate to **Configuration** > **WLAN Radios**. Select the **Common** tab in the right pane. The Common configuration displays.



Field	Description
Country	Identifies the country where the AP is operating. The default country is: • **Germany** [AP3630/40 (ROW)] • **United_States** [AP3630/40 (NAM)] **Note:** Changing this setting causes the AP to reboot.
AP Environment	Specifies where the AP's antennas are installed — Indoor or Outdoor; the AP itself is installed indoors. The default for the antenna location is **Indoor**. **Note:** Changing this setting will cause the AP to reboot.

Field	Description
Left Antenna Type (AP3640 only)	Select the external antenna connected to the Left Antenna input from the drop-down menu. The default is **No Antenna**. **Caution:** Selecting the wrong antenna may cause permanent damage to the AP. **Note:** The antenna and country selected determines the available channel list and the maximum transmitting power for the country selected. **Note:** Changing this setting will cause the AP to reboot.
Middle Antenna Type (AP3640 only)	Select the external antenna connected to the MIddle Antenna input from the drop-down menu. The default is **No Antenna.** **Caution:** Selecting the wrong antenna may cause permanent damage to the AP. **Note:** The antenna and country selected determines the available channel list and the maximum transmitting power for the country selected. **Note:** Changing this setting will cause the AP to reboot.
Right Antenna Type (AP3640 only)	Select the external antenna connected to the Right Antenna input from the drop-down menu. The default is **No Antenna.** **Caution:** Selecting the wrong antenna may cause permanent damage to the AP. **Note:** The antenna and country selected determines the available channel list and the maximum transmitting power for the country selected. **Note:** Changing this setting will cause the AP to reboot.
Use Broadcast for Disconnection	Select this checkbox to enable broadcast dissociation. When enabled, the AP triggers clients to roam to other APs offering the same services when: • The AP's WLAN services or radios are re-configured • The AP is rebooted • A radar event triggers automatic channel selection Broadcast dissociation is disabled by default.
Function Buttons	
Save	Click to save your changes.
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

To configure the common properties shared by both of the AP's radios:

1. Select the **Country**.
2. Select the **AP Environment**.
3. Select the name of the actual antenna connected to the AP from each **Antenna Type** drop-down menu (AP3640 only).

Caution: Selecting the wrong antenna may cause permanent damage to the AP.

Note: The antenna you select determines the available channel list and the maximum transmitting power for the country in which the AP is deployed.

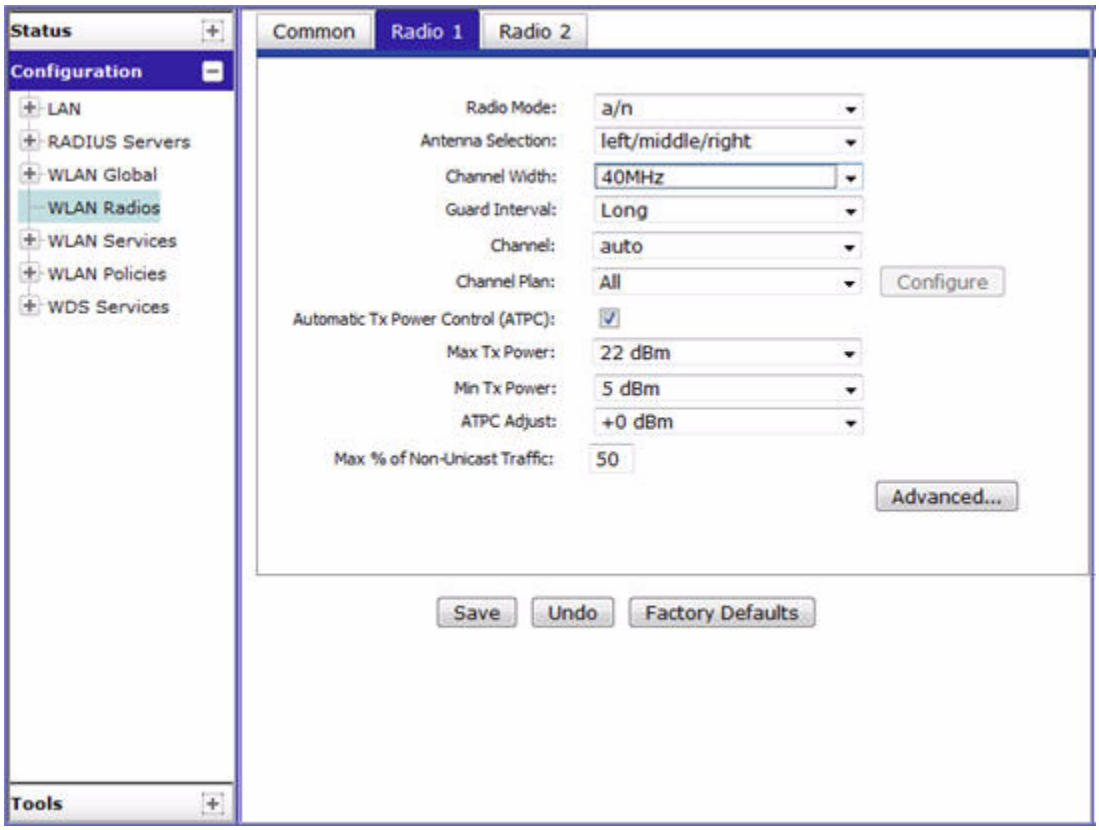
4. (Optional) Select the **Use Broadcast for Disconnection** checkbox.
5. Click **Save** to save your changes.

Configuring Individual Radio Settings

This section discusses the configuration for Radio 1 and Radio 2. Some settings are not available for both radios.

Note: If this AP is a WDS parent AP, the individual radio settings tab for the WDS radio are read-only to prevent child APs from losing their connection. The settings for the non-WDS radio can be edited.

To display the properties for each Radio, navigate to **Configuration** > **WLAN Radios**, and select either the **Radio 1** or **Radio 2** tab in the right pane. The configuration for the selected radio displays.



Field	Description
Radio Mode	Select the 802.11 protocol for the radio. The default is **off**.
Antenna Selection	Select the antenna, or antenna combination, that this radio will use for transmission. The default is **left/middle/right**.

Field	Description
Channel Width	Select the channel width. The AP can use two channels at the same time to create a 40MHz wide channel. To achieve a 40MHz channel width, the AP employs channel bonding — two 20MHz channels at the same time. Channel bonding improves the effective throughput of the wireless LAN. When selecting Channel Width, the following options are available: • **20MHz** (default) – Allows 802.11n clients to use the primary channel (20MHz) and non-802.11n clients, as well as beacons and multicasts, to use the 802.11a/b/g radio protocols. • **40MHz** – Allows 802.11n clients that support channel bonding to use it. 802.11n clients that do not support channel bonding can use the 20-MHz channel width and legacy clients will use the 802.11a/b/g or 802.11a/b protocols. • **Auto** – Automatically switches between 20MHz and 40MHz, depending on how busy the extension channel is.
Guard Interval	Select the guard interval, **Long** or **Short**. It is recommended to use a short guard interval in small rooms (for example, a small office space) and a long guard interval in large rooms (for example, a conference hall). The default guard interval is **Long**.
Channel	Select the wireless channel that the AP uses to communicate with wireless devices. Depending on the regulatory domain (based on country, environment, antenna type, radio mode and channel width), some channels may be restricted. The **auto** selection (default) allows the AP to select an appropriate channel automatically (ACS). If **auto** is selected, the current selected channel displays next to the Channel drop-down menu. The **auto-cluster** selection enables coordinated ACS on all APs within the cluster.

Field	Description
Channel Plan	Define a channel plan for the AP to be used when **auto** is selected in the **Channel** drop-down menu. A channel plan allows you to limit which channels are available for use during an ACS scan. For example, you may want to avoid using specific channels because of low power, regulatory domain, or radar interference. Select one of the following: • **All** (Radio 1 only) — ACS will scan all the channels for an operating channel. • **All Non-DFS** (Radio 1 only, default) — ACS scans all non-DFS channels for an operating channel. This selection is available when there is at least one DFS channel supported for the selected country. (default) • **3 Channels** (Radio 2 only) — the three channels are 1,6, and 11 in NAM and 1,7, and 13 in ROW. • **4 Channels** (Radio 2 only) — the four channels are 1,4,8,abd 11 in NAM and 1,5,9,and 13 in ROW. • **Auto** (Radio 2 only, default) — ACS automatically selects the 3-channel plan on NAM devices and the 4-channel plan on ROW devices. • **Custom** — If you want to configure individual channels from which the ACS will select an operating channel, click **Configure**. The Add Channels dialog displays. Select the individual channels you want to add to the channel plan while pressing the **CTRL** key, and then click **Close**.
Configure	Click to define a custom channel plan for the radio.
Automatic Tx Power Control (ATPC)	Select to enable/deselect to disable ATPC. ATPC automatically adapts transmission power signals according to the coverage provided by the APs. After a period of time, the system stabilizes itself based on the RF coverage of your APs. ATPC guarantees your LAN a stable RF environment by automatically adapting transmission power signals according to the coverage provided by the APs. ATPC is disabled by default.
Max Tx Power	Select the maximum Tx power level to which the range of transmit power can be adjusted. It is recommended to not limit the potential Tx power level range that can be used.
Min Tx Power	Select the minimum Tx power level to which the range of transmit power can be adjusted. It is recommended to use the lowest value available to not limit the potential Tx power level range that can be used. The **Min Tx Power** drop-down menu only displays if **Automatic TX Power Control (ATPC)** is selected.
ATPC Adjust	Select the Tx power level that can be used to adjust the ATPC power levels that the system has assigned. It is recommended to use +0 dBm during your initial configuration. If you have an RF plan that recommends Tx power levels for each AP, compare the actual Tx power levels your system has assigned against the recommended values your RF plan has provided. Use the Auto Tx Power Ctrl Adjust value to achieve the recommended values. The **ATPC Adjust** drop-down menu only displays if **Automatic TX Power Control (ATPC)** is selected. The default is **+0 dBm**.

Field	Description
Max % of Non-Unicast Traffic	Enter the maximum percentage of time that the AP will transmit non-unicast packets (broadcast and multicast traffic) for each configured Beacon Period. For each non-unicast packet transmitted, the system calculates the airtime used by each packet and drops all packets that exceed the configured maximum percentage. By restricting non-unicast traffic, you limit the impact of broadcasts and multicasts on overall system performance.The default is **50**%.
Advanced...	Click to access the Advanced Radio Configuration described on page 4-23.
Function Buttons	
Save	Click to save your changes.
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

To configure the properties for the selected radio:

1. Select the **Radio Mode**. Depending on your selection, some of the radio settings may not be available.
2. Make your antenna selections from the **Antenna Selection** drop-down menu.

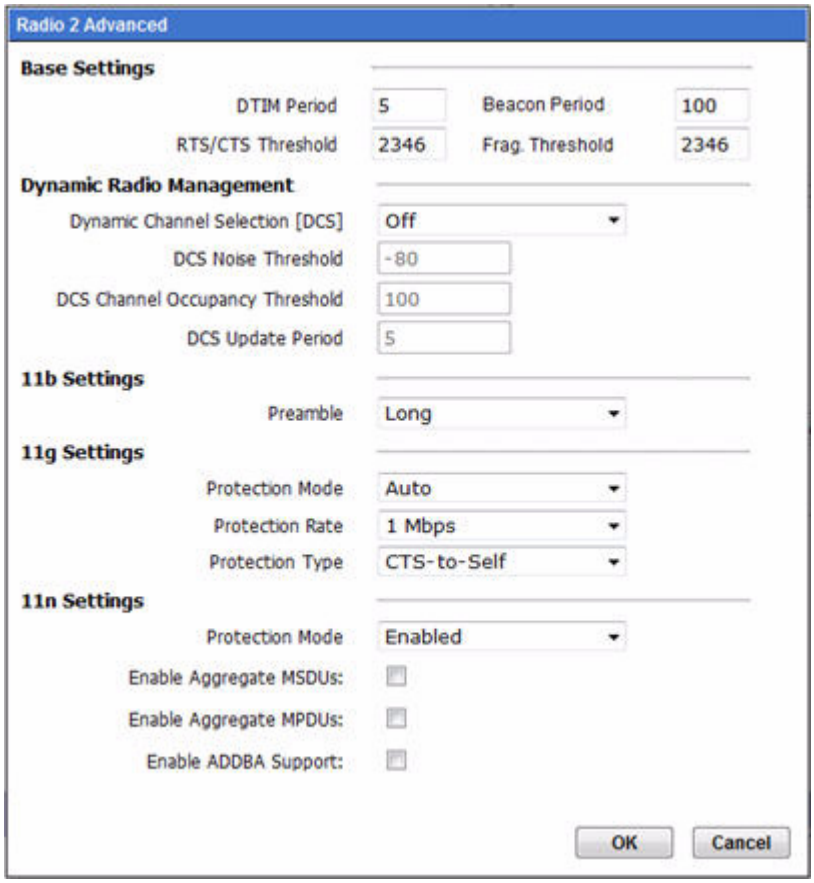
Note: When you configure the AP to use specific antennas, the transmission power is automatically adjusted.

3. (Optional) If the **Radio Mode** is set to **a/n**, change the **Channel Width** and the **Guard Interval**.
4. (Optional) Set the **Channel**.
5. (Optional) If auto is selected in the **Channel** drop-down menu, define a channel plan for the AP.
6. (Optional) Select the **Automatic Tx Power Control (ATPC)** checkbox.
7. (Optional) Set the **Max Tx Power level**.
8. (Optional) If **Automatic Tx Power Control (ATPC)** is enabled, change the **Min Tx Power**. and/or **ATPC Adjust**.
9. (Optional) Set the **Max % of Non-Unicast Traffic**.
10. Click **Save** to save your changes.

Advanced Radio Configuration

This section discusses the advanced radio configuration. Advanced radio configuration is available for maximum customization but is not required.

To display the advanced radio configuration, navigate to **Configuration** > **WLAN Radios**, and select either the **Radio 1** or **Radio 2** tab in the right pane. The configuration for the selected radio displays. Click **Advanced...**. The advanced radio configuration dialog displays.



Field	Description
Base Settings	
DTIM Period	Enter the number of beacon intervals between two DTIM beacons. To ensure the best client power savings, use a large number. Use a small number to minimize broadcast and multicast delay. The default value is **5**.
Beacon Period	Enter the desired time, in milliseconds, between beacon transmissions. The default value is **100** milliseconds.
RTS/CTS Threshold	Enter the packet size threshold, in bytes, above which the packet will be preceded by an RTS/CTS (Request to Send/Clear to Send) handshake. The default value is **2346**, which means all packets are sent without RTS/CTS. Reduce this value only if necessary.
Frag. Threshold	Enter the fragment size threshold, in bytes, above which the packets will be fragmented by the AP prior to transmission. The default value is **2346**, which means all packets are sent unfragmented. Reduce this value only if necessary.

Field	Description
Dynamic Radio Management	
Dynamic Channel Selection (DCS)	Select the DCS mode. DCS allows the AP to monitor traffic and noise levels on the channel on which the AP is currently operating. DCS can operate in two modes or be disabled: • **Monitor Mode** – When DCS is enabled in monitor mode and traffic or noise levels exceed the configured DCS thresholds, an alarm is triggered and an information log is generated. The DCS monitor alarm is used for evaluating the RF environment of your deployed APs. • **Active Mode** – When DCS is enabled in active mode and traffic or noise levels exceed the configured DCS thresholds, an alarm is triggered and an information log is generated. In addition, the AP will cease operating on the current channel and ACS is employed to automatically select an alternate channel for the AP to operate on. DCS will not trigger channel changes on neighboring APs. • **Off** (default)— Disables DCS.
DCS Noise Threshold	Enter the noise interface threshold, measured in dBm. DCS will scan for a new operating channel for the AP if this threshold is exceeded. The default is **-80** dBm.
DCS Channel Occupancy Threshold	Enter the channel utilization level, measured as a percentage. DCS will scan for a new operating channel for the AP if the threshold is exceeded. The default is **100**%.
DCS Update Period	Enter the time, measured in minutes that determines the period during which the AP averages the DCS Noise Threshold and DCS Channel Occupancy Threshold measurements. If either one of these thresholds is exceeded, then the AP will trigger DCS. The default is **5** minutes.

Field	Description
11b Settings (Radio 2 only)	
Preamble	Select a preamble for 11b-specific (CCK) rates: Short or Long. • Select **Short** if compatibility with early 11b clients is not required. • Select **Long** (default) if compatibility with early 11b clients is required. To avoid problems with wireless communication, all APs, network adapters, and other wireless devices should use the same preamble. High network traffic areas should use a **Short** preamble.
11g Settings (Radio 2 only)	
Protection Mode	Select a protection mode: **None**, **Auto**, or **Always**. The default and recommended setting is **Auto**. Click **None** if 11b APs and clients are not expected. Click **Always** if you expect many 11b-only clients. **Note:** The overall throughput is reduced when **Protection Mode** is enabled, due to the additional overhead caused by the RTS/CTS. The overhead is minimized by setting Protection Type to **CTS-to-Self** and **Protection Rate** to 11 Mbps. The overhead causes the overall throughput to be sometimes lower than if just 11b mode is used. If there are many 11b clients, it is recommended to disable 11g support (11g clients are backward compatible with 11b APs). An alternate approach, although potentially a more expensive method, is to dedicate all APs on a channel for 11b (for example, disable 11g on these APs) and disable 11b on all other APs. The difficulty with this method is that the number of APs must be increased to ensure coverage separately for 11b and 11g clients.
Protection Rate	Select a protection rate: 1, 2, 5.5, or 11 Mbps. The default and recommended setting is **11**. Only reduce the rate if there are many 11b clients in the environment or if the deployment has areas with poor coverage. For example, rates lower than 11 Mbps are required to ensure coverage.
Protection Type	Select a protection type: **CTS-to-Self** or **RTS-CTS**. The default and recommended setting is **CTS-to-Self**. Select **RTS-CTS** only if an 11b AP that operates on the same channel is detected in the neighborhood, or if there are many 11b-only clients in the environment.
11n Settings	
Protection Mode	Enable or disable protection mode. This protects high throughput transmissions on primary channels from non-11n APs and clients. Click **Disabled** if non-11n APs and clients are not expected. Click **Enabled** if you expect many non-11n APs and clients. The overall throughput is reduced when **Protection Mode** is enabled. The protection mode is enabled by default.
40MHz Protection Mode	Select a 40MHz protection type, **CTS-to-Self** or **RTS- CTS**, or **None**. This protects high throughput transmissions on extension channels from interference from non-11n APs and clients when a 40MHz channel is used. The default is **CTS-to-Self**.

Field	Description
40MHz Protection Channel Offset	Select a 20MHz channel offset if the deployment is using channels that are 20MHz apart (for example, using channels 1, 5, 9, and 13) or a 25MHz channel offset (default) if the deployment is using channels that are 25MHz apart (for example, using channels 1, 6, and 11).
40MHz Channel Busy Threshold	Enter the extension channel threshold percentage, which if exceeded, will disable transmissions on the extension channel (40MHz).The default threshold is **50**%.
Enable Aggregate MSDUs	Select to aggregate short packets. Enabling increase the maximum frame transmission size but increases latency. This value is disabled by default.
Aggregate MSDU Max Length	Enter the maximum length of the aggregate MSDU. The value range is 2290-4096 bytes.The default is **4096** bytes.
Enable Aggregate MPDUs	Select to enable/deselect to disable aggregate MPDUs. Enabling Aggregate MPDU reduces overhead and increases throughput of usable data by compiling all of the data into clumps. The size of each clump is determined by: **Aggregate MPDU Max Packets** x **Aggregate MPDU Max Length**. **Enable Aggregate MPDUs** is disabled by default.
Aggregate MPDU Max Length	If **Enable Aggregate MPDUs** is enabled, enter the maximum bytes of each MPDU packet. The value range is 1024-65535 bytes. The default is **65535** bytes.
Aggregate MPDU Max Packets	If **Enable Aggregate MPDUs** is enabled, enter the maximum number of packets in each MPDU clump. The value range is 2-64. the default is **64**.
Enable ADDBA Support	Select to enable/deselect to disable ADDBA support. ADDBA, or block acknowledgement, provides acknowledgement of a group of frames instead of a single frame. ADDBA support is disabled by default.
Function Buttons	
OK	Click to save the values and close the Advanced dialog.
Cancel	Click to close the Advanced dialog without saving changes.

To configure the advanced radio settings:

1. Change the **Base Settings**:
   - (Optional) Change the **DTIM Period**.
   - (Optional) Change the **Beacon Period**.
   - (Optional) Change the **RTS/CTS Threshold**.
   - (Optional) Change the **Frag. Threshold**.
2. Change the **Dynamic Radio Management** settings:
   - (Optional) Change the **Dynamic Channel Selection (DCS)** mode.
   - (Optional) If **Monitor Mode** or **Active Mode** is selected in the **Dynamic Channel Selection (DCS)** drop-down menu, change the **DCS Noise Threshold**, **DCS Channel Occupancy Threshold**, and/or **DCS Update Period**.

3. Change the **11b Settings**:
   - (Optional) Change the Preamble.
4. Change the **11g Settings**:
   - (Optional) Change the **Protection Mode**, **Protection Rate**, and/or **Protection type**.

Note: The overall throughput is reduced when **Protection Mode** is enabled, due to the additional overhead caused by the RTS/CTS. The overhead is minimized by setting Protection Type to **CTS-to-Self** and **Protection Rate** to 11 Mbps. The overhead causes the overall throughput to be sometimes lower than if just 11b mode is used. If there are many 11b clients, it is recommended to disable 11g support (11g clients are backward compatible with 11b APs).

An alternate approach, although potentially a more expensive method, is to dedicate all APs on a channel for 11b (for example, disable 11g on these APs) and disable 11b on all other APs. The difficulty with this method is that the number of APs must be increased to ensure coverage separately for 11b and 11g clients.

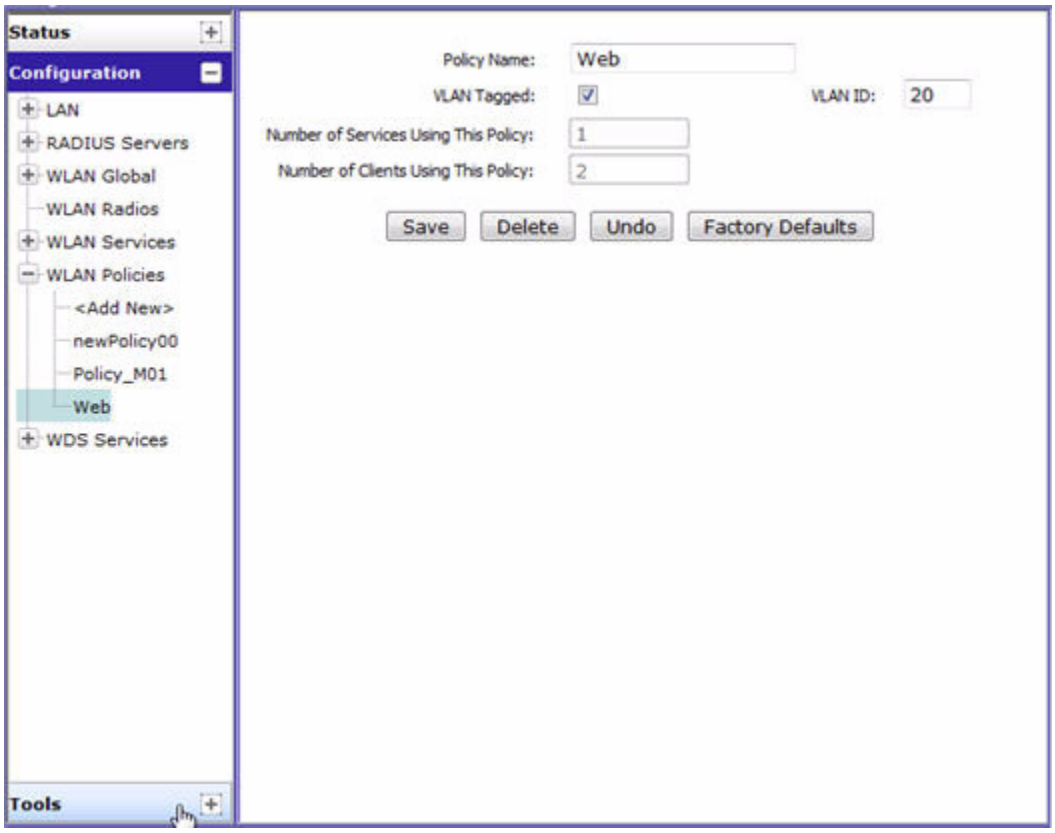
5. Change the **11n Settings**:
   - (Optional) Change the **Protection Mode**.
   - (Optional) If **Auto** or **40MHz** is selected as the Channel Width, configure the 40MHz settings:
     (1) Change the **40MHz Protection Mode**. The **40MHz Channel Offset** and **40MHz Channel Busy Threshold** fields display.
     (2) Change the **40Mhz Channel Offset** and **40MHz Protection Channel Offset**.
   - (Optional) Configure Aggregate MSDUs:
     (1) Select the **Enable Aggregate MSDUs** checkbox. The **Aggregate MSDU Max Length field** displays.
     (2) Change the **Aggregate MSDU Max Length**.
   - (Optional) Configure Aggregate MPDUs:
     (1) Select the **Enable Aggregate MPDUs** checkbox. The **Aggregate MPDU Max Length** and **Aggregate MPDU Max Packets** fields display.
     (2) Change the **Aggregate MPDU Max Length** and the **Aggregate MPDU Max Packets**.
   - (Optional) Select the **Enable ADDBA Support** checkbox.
6. Click **Close** to close the advanced settings dialog. Click **Save** on the selected radio tab to save your changes.

Note: Changes to the advanced radio configuration are not saved until you close the Advanced dialog and click **Save** on the selected radio configuration tab.

Configuring WLAN Policies

A policy associates an AP with a particular VLAN to logically group APs. By using VLANs, you can control traffic patterns and react quickly to client roaming. This section discusses how to set up a WLAN policy. You can create up to sixty-four WLAN policies. Policies are applied to the AP through WLAN services.

To display the WLAN policy settings, navigate to **Configuration** > **WLAN Policies**, and select the policy you want to edit or select **<Add New>**. The WLAN policy settings display in the right pane.



Field	Description
Policy Name	Enter a name for the policy. The default policy name is **newPolicy00**.
VLAN Tagged	Select to enable/deselect to disable VLAN tagging. When you enable VLAN tagging, the AP inserts the VLAN ID in the data packet header to identify which VLAN the packet belongs to. If selected, you must enter a value in the **VLAN ID** field. **VLAN Tagged** is disabled by default.
VLAN ID	If the **VLAN Tagged** checkbox is selected, enter the ID of the VLAN on which the policy will operate. The default value is **1**.
Number of Services Using This Policy	Displays the number of services currently using this policy.
Number of Clients Using This Policy	Displays the number of clients currently using this policy.
Function Buttons	
Save	Click to save your changes.

Field	Description
Delete	Click to delete the WLAN policy.
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

To configure a WLAN policy:

1. Enter a meaningful name for the policy.
2. (Optional) Enable VLAN tagging by selecting the **VLAN Tagged** checkbox and entering the **VLAN ID**.
3. Click **Save** to save your changes.

Configuring WLAN Services

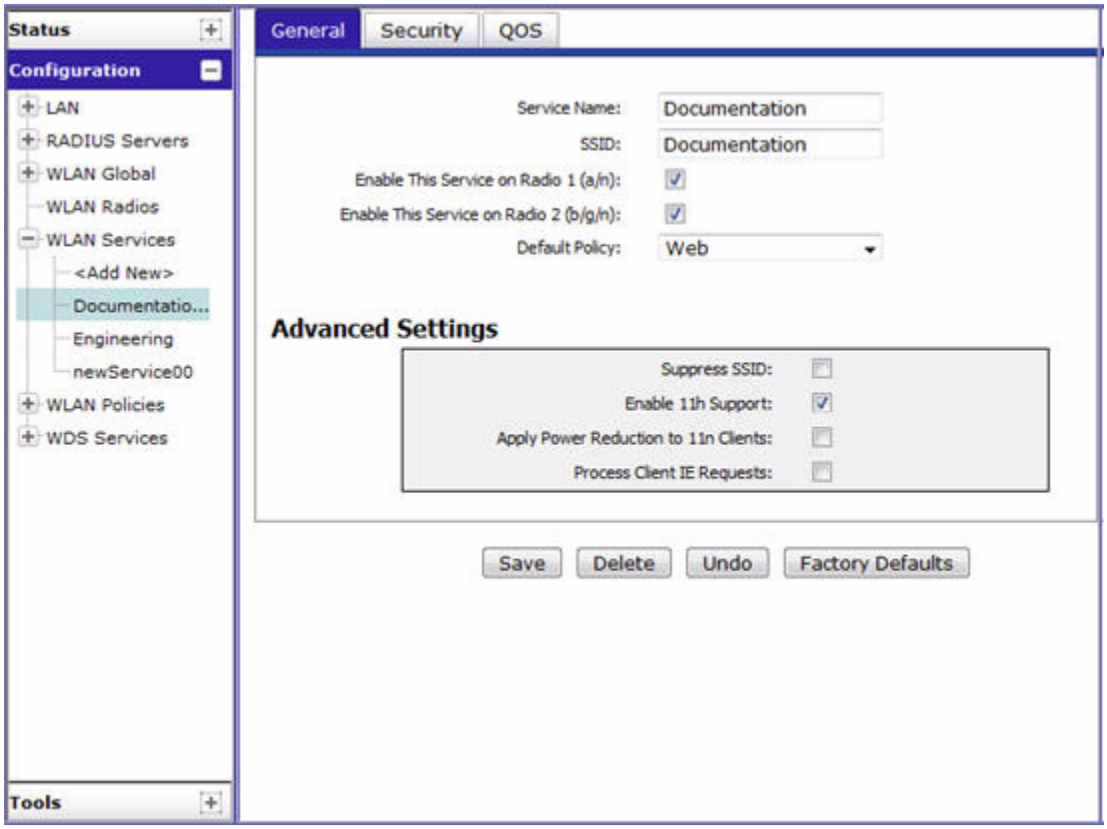
A WLAN service represents all the RF, authentication and QoS attributes of a wireless access service. WLAN services also serve as the means to applying policy to clients. This section describes how to configure general properties, privacy, and QoS for a WLAN service. You can create up to sixteen services on the AP, including WDS.

Note: You must configure at least one WLAN policy before creating and configuring a WLAN service.

Configuring WLAN Service General Properties

This section discusses how to configure the name of a WLAN service, enable the service on a radio, associate the service with a policy, and configure advanced settings.

To display the general properties of a WLAN service, navigate to **Configuration** > **WLAN Services**, and select the service you want to edit or select **<Add New>**. The General tab of the WLAN services configuration displays in the right pane.



Field	Description
Service Name	Enter the name of the WLAN service. You can change this field only if you are adding a new WLAN service. The default service name is **newService00**.
SSID	Enter the SSID of the WLAN service. The software automatically populates the SSID field with the default service name.
Enable This Service on Radio 1 (a/n)	Select to enable/deselect to disable the WLAN service on Radio 1. The WLAN service is enabled on Radio 1 by default.
Enable This Service on Radio 2 (b/g/n)	Select to enable/deselect to disable the WLAN service on Radio 2. The WLAN service is enabled on Radio 2 by default.
Default Policy	Select a policy as the default for this WLAN service.
Advanced Settings	
Suppress SSID	Select to prevent/deselect to allow this SSID from appearing in the beacon message sent by the AP. The wireless device user seeking network access will not see this SSID as an available choice, and will need to specify it. SSIDs are allowed by default.
Enable 11h Support	Select to enable/deselect to disable TPC (Transmission Power Control) reports. By default this option is disabled. It is recommended to enable this option. 11h support is disabled by default.
Apply Power Reduction to 11h Clients	Select to enable/deselect to disable the AP to use reduced power (as does the 11h client). By default this option is disabled. It is recommended to enable this option. Power reduction to 11h clients is disabled by default.

Field	Description
Process Client IE Requests	Select to enable/deselect to disable the AP to accept IE requests sent by clients via Probe Request frames and responds by including the requested IE's in the corresponding Probe Response frames. By default this option is disabled. It is recommended to enable this option.
Function Buttons	
Save	Click to save your changes.
Delete	Click to delete the WLAN service.
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

To configure the General properties of a WLAN service:

1. (Optional) Change the **Service Name**.
2. (Optional) Change the **SSID** or leave the default.
3. Select at least one radio to enable this service on.
4. Select the **Default Policy**.
5. (Optional) Configure the Advanced Settings for the WLAN service:
   a. Select **Suppress SSID**.
   b. Select **Enable 11h Support**. The Apply Power Reduction to 11n Clients checkbox displays.
   c. Select **Apply Power Reduction to 11n** Clients.
   d. Select **Process Client IE Requests**.
6. Click **Save** to save your changes.

Configuring WLAN Service Security

The WLAN Service Security tab allows you to choose from five privacy modes:

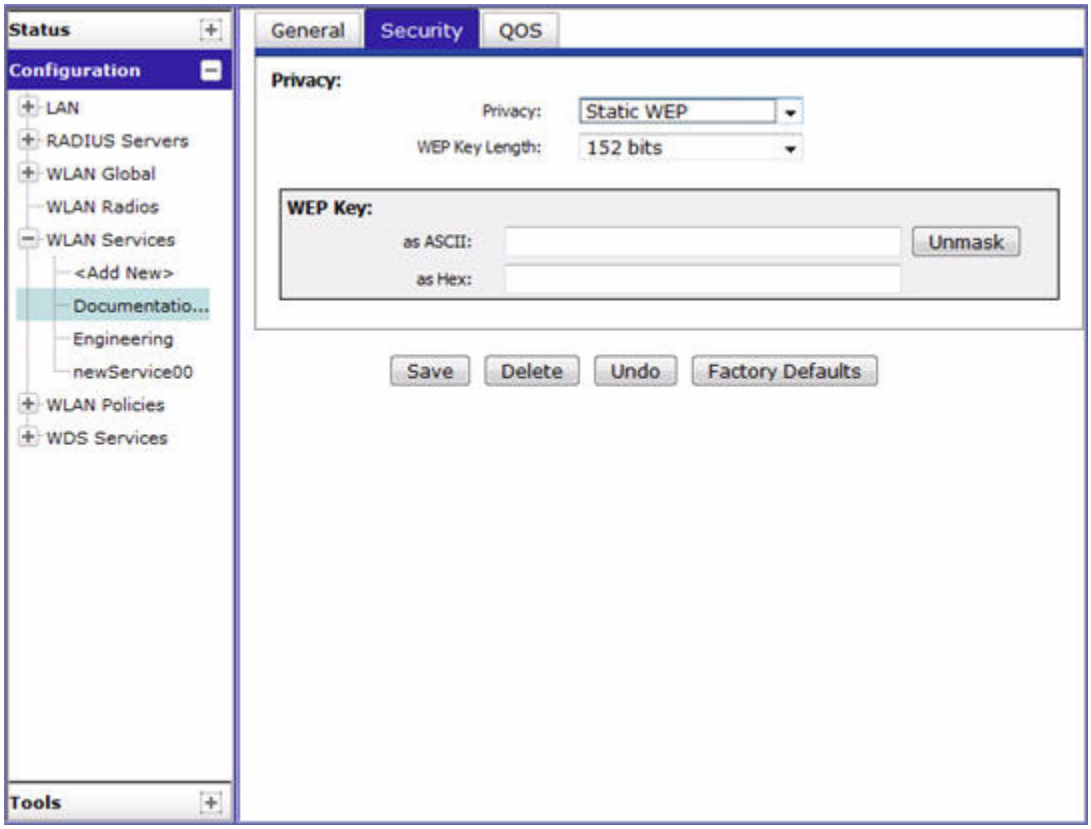
- **None**
- **Static Wired Equivalent Privacy (WEP)** – Keys for a selected WLAN service, so that it matches the WEP mechanism used on the rest of the network. For each WLAN service, only one WEP key can be specified. It is treated as the first key in a client's list of WEP keys.

  WEP provides a basic level of security, preventing unauthorized access to the network and encrypting data transmitted between wireless clients and the access point. WEP uses static shared keys (fixed-length hexadecimal or alphanumeric strings) that must be known to clients that want to use the network. You must manually distribute to all clients that want to use the network.
- **Dynamic WEP** – Dynamic WEP provides the same security as Static WEP. The difference is that the dynamic WEP mechanism changes the key for each user and each session.
- **Wi-Fi Protected Access (WPA) Pre-Shared key (PSK)** – Privacy in PSK mode, using a Pre-Shared Key (PSK), or shared secret for authentication. WPA-PSK is a security solution that adds authentication to enhanced WEP encryption and key management. WPA-PSK mode does not require an authentication server. It is suitable for home or small office.

- **WPA-Authentication, Authorization and Accounting (AAA)** —Privacy using a RADIUS server to authenticate clients credentials. WPA-AAA, like WPA-PSK, is a security solution that adds authentication to enhanced WEP encryption and key management.

Configuring Static WEP

To display Static WEP privacy settings, navigate to **Configuration** > **WLAN Services**, and select the service you want to edit or select **<Add New>**. Select the **Security** tab. Select **Static WEP** from the **Privacy** drop-down menu. The Static WEP configuration displays.



Field	Description
Privacy	
Privacy	Select the security mode for the WLAN service from the drop-down menu. Privacy is set to **None** by default.
WEP Key Length	Select the WEP encryption key length, either 64, 128, or 152 (default) bits.
WEP Key	
as ASCII	Enter a WEP key in ASCII format.
Unmask	Click to display the value entered in the **as ASCII** and **as Hex** fields.
as Hex	Enter a WEP key in Hexadecimal format.
Function Buttons	
Save	Click to save your changes.
Delete	Click to delete the WLAN service.

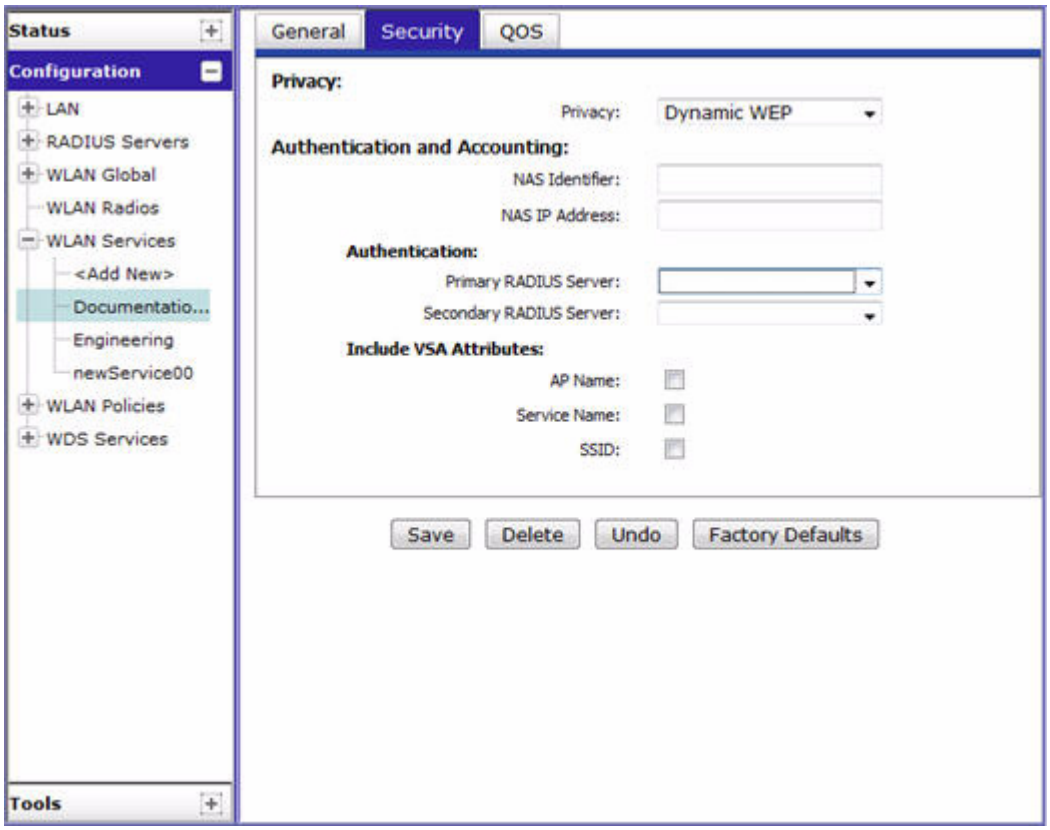
Field	Description
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

To configure Static WEP privacy:

1. (Optional) Change the **WEP Key Length**.
2. Enter the **WEP Key**. Click **Unmask** to view and proofread the key.
3. Click **Save** to save your changes.

Configuring Dynamic WEP

To display dynamic WEP privacy settings, navigate to **Configuration** > **WLAN Services**, and select the service you want to edit or select **<Add New>**. Select the **Security** tab. Select **Dynamic WEP** from the **Privacy** drop-down menu. The Dynamic WEP configuration displays.



Field	Description
Privacy	
Privacy	Select the security mode for the WLAN service from the drop-down menu. Privacy is set to **None** by default.

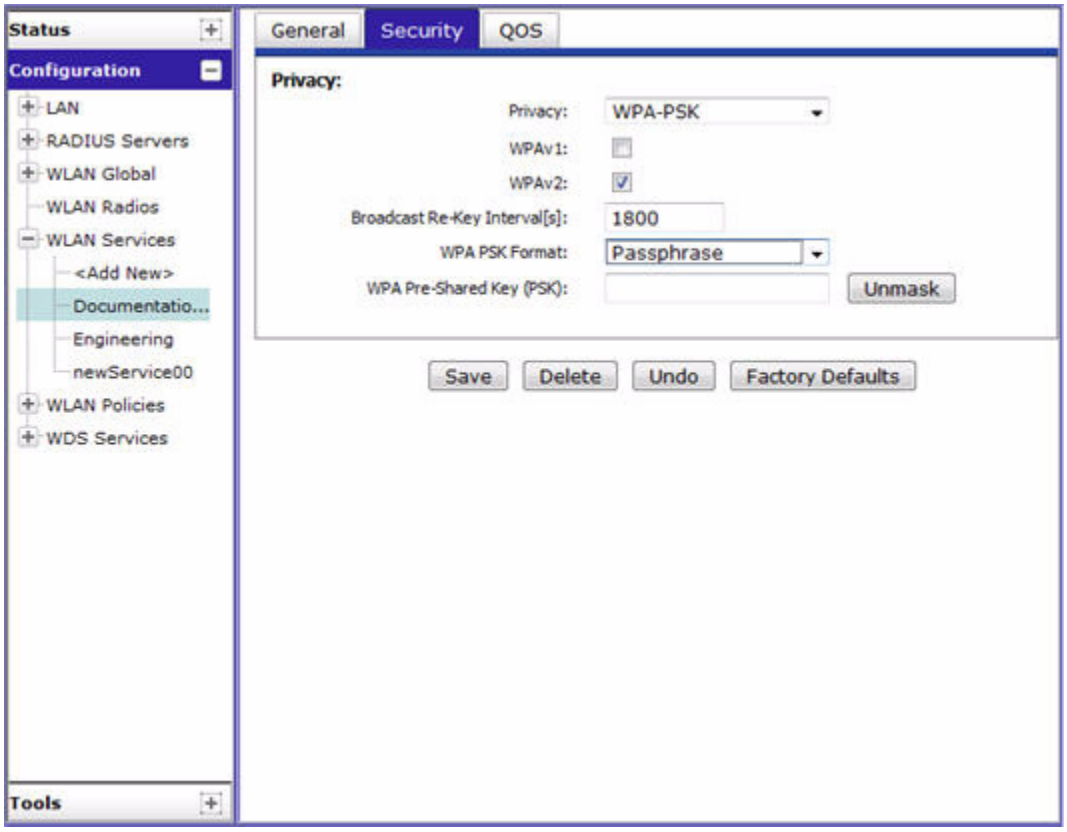
Field	Description
Authentication and Accounting	
NAS Identifier	Enter the identifier for the Network Access Server (NAS). The NAS identifier is a RADIUS attribute that identifies the server responsible for passing information to designated RADIUS servers and then acting on the response returned.
NAS IP Address	Enter the IP address of the Network Access Server.
Authentication	
Primary RADIUS Server	Select the primary RADIUS server.
Secondary RADIUS Server	Select the secondary RADIUS server.
Include VSA Attributes	
AP Name	Select to include the name of the AP in Vendor Specified Attributes (VSA). VSAs provide information on the identity of the specific AP that is handling the wireless device, enabling the provision of location-based services. The AP name is not included in VSA attributes by default.
Service Name	Select to include the WLAN service name in VSA attributes. VSA provide information on the identity of the specific AP that is handling the wireless device, enabling the provision of location-based services. The WLAN service name is not included in VSA attributes by default.
SSID	Select to include the SSID of the AP in VSA attributes. VSA provide information on the identity of the specific AP that is handling the wireless device, enabling the provision of location-based services. The SSID of the AP is not included in VSA attributes by default.
Function Buttons	
Save	Click to save your changes.
Delete	Click to delete the WLAN service.
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

To configure Dynamic WEP privacy:

1. Configure Authentication and Accounting:
   - Enter the **NAS Identifier**.
   - Enter the **NAS IP Address**.
2. Configure Authentication:
   - Select the **Primary RADIUS Server**.
   - (Optional) Select the **Secondary RADIUS Server**.
3. (Optional) Select the **VSA Attributes — AP Name**, **Service Name**, and/or **SSID**.
4. Click Save to save your changes.

Configuring WPA-PSK

To display WPA-PSK privacy settings, navigate to **Configuration** > **WLAN Services**, and select the service you want to edit or select **<Add New>**. Select the **Security** tab. Select **WPA-PSK** from the **Privacy** drop-down menu. The WPA-PSK configuration displays.



Field	Description
Privacy	
Privacy	Select the security mode for the WLAN service from the drop-down menu. Privacy is set to **None** by default.
WPAv1	Select WPA v1 to use encryption by temporal key integrity protocol (TKIP). WPAv1 is disabled by default.
WPAv2	Select WPA v2 to use encryption by advanced encryption standard with counter-mode/CBC-MAC protocol (AES-CCMP). WPA. WPAv2 is enabled by default.
Broadcast Re-Key Interval(s)	Enter the time interval, in seconds, after which the broadcast encryption key is changed automatically. The time interval can range from 30 to 86,400 seconds. The default is **1800** seconds.
WPA PSK Format	Select the format: **Passphrase** (default) or **Hex**.
WPA Pre-Shared Key (PSK)	Enter the secret WPA key string used for encrypting and decrypting.
Unmask	Click to display the value entered in the WPA Pre-Shared key (PSK) field.

Field	Description
Function Buttons	
Save	Click to save your changes.
Delete	Click to delete the WLAN service.
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

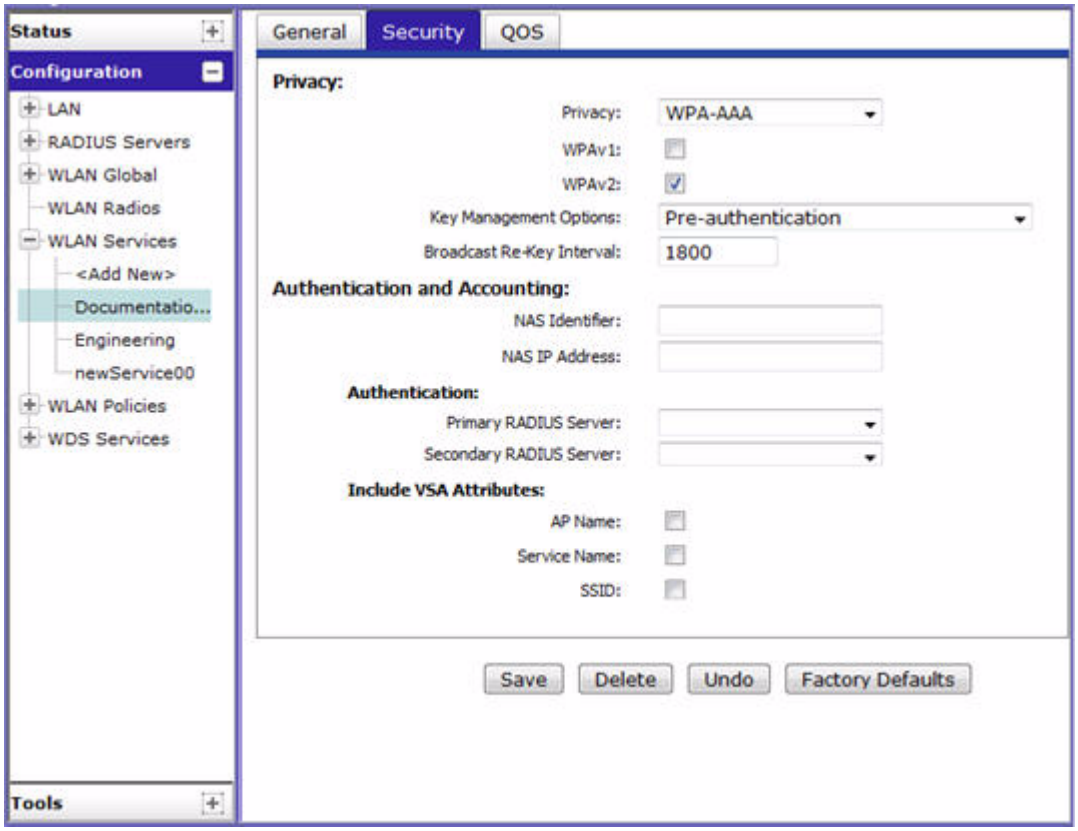
To configure WPA-PSK privacy:

1. Select one or both of the WPA version checkboxes.
2. (Optional) Change the **Broadcast Re-Key Interval(s)**.
3. (Optional) Change the **WPA PSK Format**.
4. Enter the **WPA Pre-Shared Key**. Click **Unmask** to view and proofread the key.
5. Click **Save** to save your changes.

Configuring WPA-AAA

This section discusses how to configure WLAN service security using WPA-AAA.

To display WPA-AAA privacy settings, navigate to **Configuration** > **WLAN Services**, and select the service you want to edit or select **<Add New>**. Select the **Security** tab. Select **WPA-AAA** from the **Privacy** drop-down menu. The WPA-AAA configuration displays.



Field	Description
Privacy	
Privacy	Select the security mode for the WLAN service from the drop-down menu. Privacy is set to **None** by default.
WPAv1	Select WPA v1 to use encryption by temporal key integrity protocol (TKIP). WPAv1 is disabled by default.
WPAv2	Select WPA v2 to use encryption by advanced encryption standard with counter-mode/CBC-MAC protocol (AES-CCMP). WPA. WPAv2 is enabled by default.
Key Management Options	Select how clients authenticate when roaming between different APs on the same WLAN Service. These options make it easier for clients to roam without having to re-authenticate every time. Select one of the following: • **None** — The mobile units (client devices) performs a complete 802.1X authentication each time it associates or connects to a Wireless AP. • **Opportunistic Keying** — Enables secure fast roaming (SFR) of mobile units. • **Pre-authentication** — Enables seamless roaming. • **Opportunistic Keying & Pre-Auth** — Enables secure fast roaming (SFR) of mobile units and seamless roaming. This option is meant for device clients that support both authentication processes. For example, the Microsoft-operated device clients support opportunistic keying by default, but they can be configured to support pre-authentication too.
Broadcast Re-Key Interval(s)	Enter the time interval, in seconds, after which the broadcast encryption key is changed automatically. The time interval can range from 30 to 86,400 seconds. The default is **1800** seconds.
Authentication and Accounting	
NAS Identifier	Enter the identifier for the Network Access Server (NAS). The NAS identifier is a RADIUS attribute that identifies the server responsible for passing information to designated RADIUS servers and then acting on the response returned.
NAS IP Address	Enter the IP address of the Network Access Server.
Authentication	
Primary RADIUS Server	Select the primary RADIUS server.
Secondary RADIUS Server	Select the secondary RADIUS server.
Include VSA Attributes	
AP Name	Select to include the name of the AP in VSA attributes. Vendor Specific Attributes (VSA) provide information on the identity of the specific AP that is handling the wireless device, enabling the provision of location-based services. The AP name is not included in VSA attributes by default.
Service Name	Select to include the WLAN service name in VSA attributes. Vendor Specific Attributes (VSA) provide information on the identity of the specific AP that is handling the wireless device, enabling the provision of location-based services. The WLAN service name is not included in VSA attributes by default.

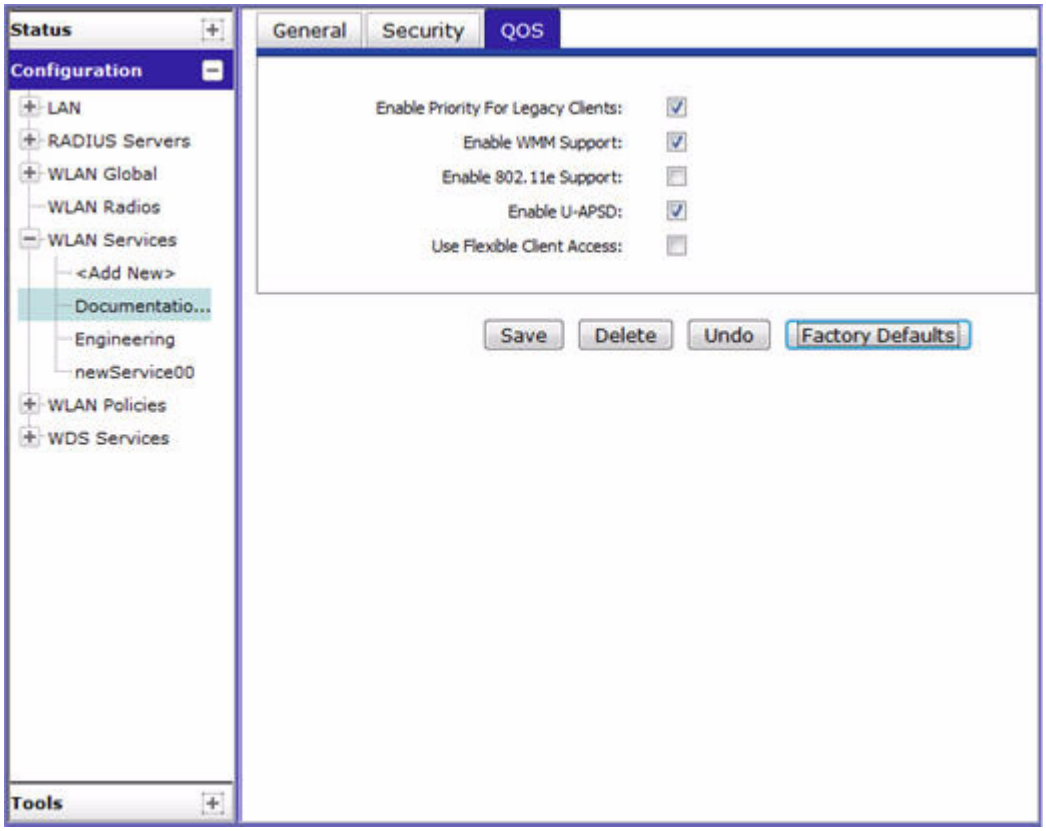
Field	Description
SSID	Select to include the SSID of the AP in VSA attributes. Vendor Specific Attributes (VSA) provide information on the identity of the specific AP that is handling the wireless device, enabling the provision of location-based services. The SSID of the AP is not included in VSA attributes by default.
Function Buttons	
Save	Click to save your changes.
Delete	Click to delete the WLAN service.
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

To configure WPA-AAA privacy:

1. Select one or both of the WPA version checkboxes. If **WPAv2** is selected, the **Key Management Options** field displays.
   - (Optional) Change the **Key Management Options**.
2. (Optional) Change the **Broadcast Re-Key Interval(s)**.
3. Configure Authentication and Accounting:
   - Enter the **NAS Identifier**.
   - Enter the **NAS IP Address**.
4. Configure Authentication:
   - Select the **Primary RADIUS Server**.
   - (Optional) Select the **Secondary RADIUS Server**.
5. (Optional) Select the **VSA Attributes — AP Name**, **Service Name**, and/or **SSID**.
6. Click **Save** to save your changes.

Configuring Quality of Service (QoS) for a WLAN Service

To display QoS settings for a WLAN service, navigate to **Configuration** > **WLAN Services**, and select the service you want to edit or select **<Add New>**. Select the **QOS** tab. The QoS configuration displays.



Field	Description
Enable Priority For Legacy Clients	Enables your service to support legacy devices. This value is enabled by default.
Enable WMM Support	Select to enable the AP to accept WMM client associations, and classify and prioritize the downlink traffic for all WMM clients. Note that WMM clients will also classify and prioritize the uplink traffic. WMM is part of the 802.11e standard for QoS. This value is enabled by default.
Enable 802.11e Support	Select to enable the AP to accept 802.11e client association, and classify and prioritize the downlink traffic for all 802.11e clients. The 802.11e clients will also classify and prioritize the uplink traffic. 802.11e support is disabled by default.
Enable U-APSD	Select to enable the Unscheduled Automatic Power Save Delivery (U-APSD) feature. This feature can be used by mobile devices to efficiently sustain one or more real-time streams while being in power-save mode. This feature works in conjunction with WMM and/or 802.11e, and it is automatically disabled if both WMM and 802.11e are disabled. U-APSD is enabled by default.
Use Flexible Client Access	Select to enable flexible client access. Flexible client access levels are set as part of the WLAN global settings. Flexible client access is disabled by default.

Field	Description
Function Buttons	
Save	Click to save your changes.
Delete	Click to delete the WLAN service.
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

To configure QoS for a WLAN service:

1. Select the checkboxes for each QoS mode you want to include in this WLAN service:
   - **Priority For Legacy Clients**
   - **Enable WMM Support**
   - **Enable 802.11e Support**
   - **Enable U-APSD**
   - **Use Flexible Client Access**
2. Click **Save** to save your changes.

5

Configuring WDS

A Wireless Distribution System (WDS) enables you to expand the wireless network by interconnecting APs through wireless links in addition to the traditional method of interconnecting APs through a wired network. This chapter discusses the WDS capabilities of the AP, deployment options, and how to create and configure a WDS.

For information about...	Refer to page...
About WDS	5-1
WDS WLAN Services	5-3
Key Features of WDS	5-6
Before Configuring WDS Services	5-9
Configuring a WDS Service	5-10

About WDS

WDS services represent a group of APs organized into a hierarchy for purposes of providing a wireless distribution service. This type of service is in essence a wireless trunking service rather than a service that provides access for stations. As such, this type of service cannot have policies attached to it.

A WDS deployment is ideally suited for locations where installing Ethernet cabling is too expensive, or physically impossible.

The WDS can be deployed in three ways:

- Simple WDS Configuration
- Wireless Repeater Configuration
- Wireless Bridge Configuration

Simple WDS Configuration

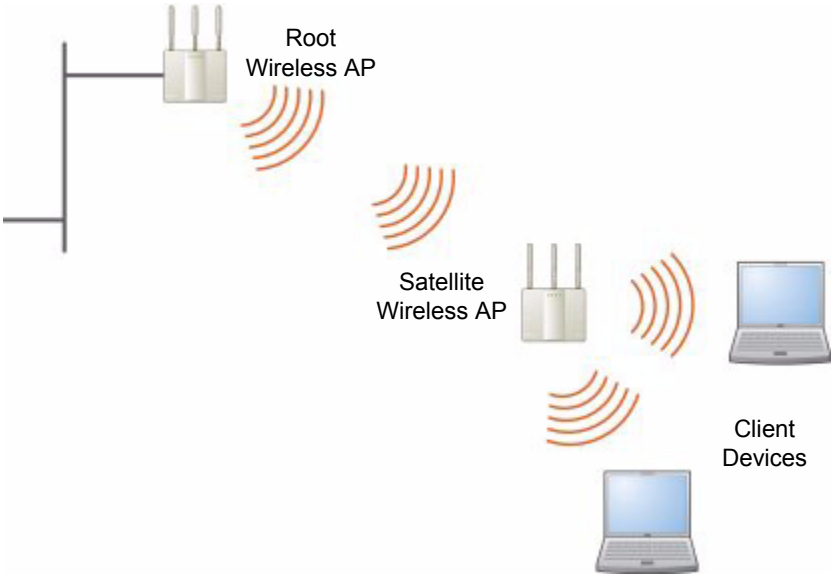
In a typical configuration, the APs are connected to an Ethernet network, which provides connectivity to clients.

However, when an AP is installed in a remote location and cannot be wired to the distribution system, an intermediate AP is connected to the distribution system through the Ethernet link. This intermediate AP forwards and receives the user traffic from the remote AP over a radio link.

The intermediate AP that is connected to the distribution system via the Ethernet network is called the Root AP, and the AP that is remotely located is called the Satellite AP.

The Figure 5-1 on page 5-2 illustrates the Simple WDS configuration.

Figure 5-1 Simple WDS Configuration

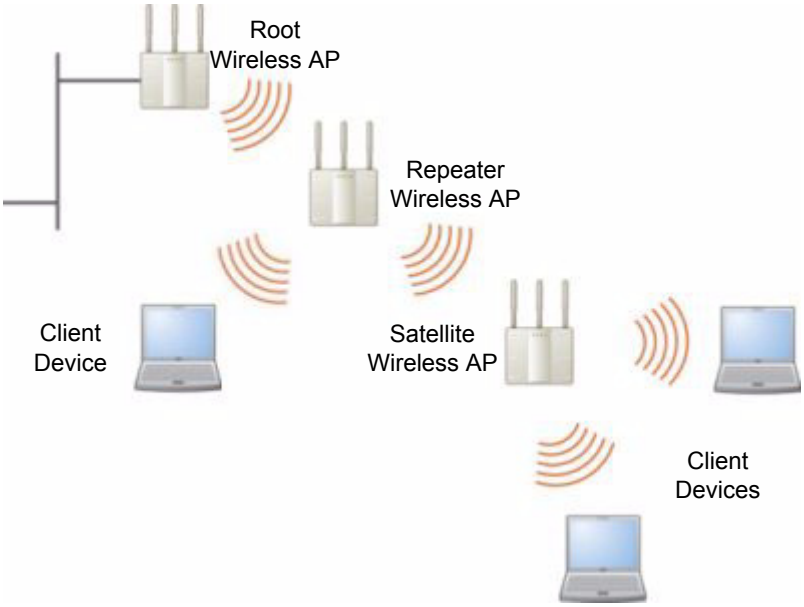


Wireless Repeater Configuration

In Wireless Repeater configuration, a Repeater AP is installed between the Root AP and the Satellite AP. The Repeater AP relays the user traffic between the Root AP and the Satellite AP. This increases the WLAN range. The Repeater Wireless AP can also communicate with client devices.

The Figure 5-2 illustrates the Wireless Repeater configuration.

Figure 5-2 Wireless Repeater Configuration



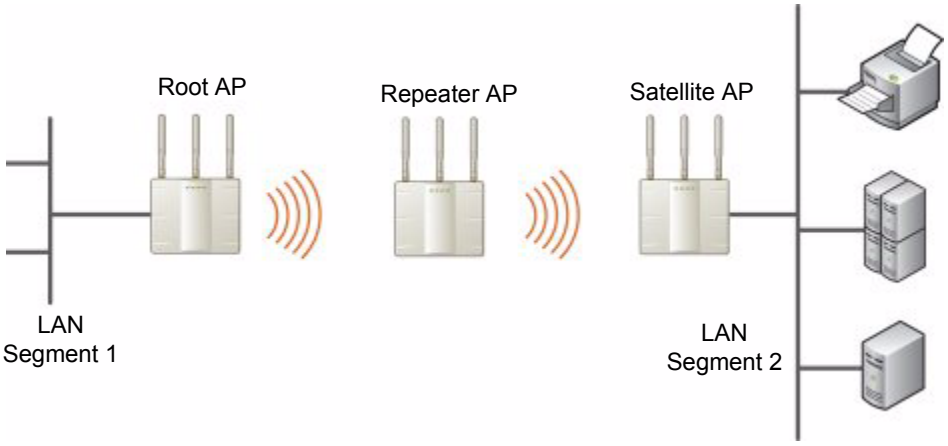
You should restrict the configuration to two hops between Satellite and Root APs for optimum performance.

Wireless Bridge Configuration

In Wireless Bridge configuration, the traffic between two APs that are connected to two separate wired LAN segments is bridged via WDS link. You may also install a Repeater AP between the two APs connected to two separate LAN segments.

The Figure 5-3 illustrates the Wireless Bridge configuration:

Figure 5-3 Wireless Bridge Configuration



When you are configuring the Wireless Bridge, you must specify the AP that is connected to the wired LAN.

WDS WLAN Services

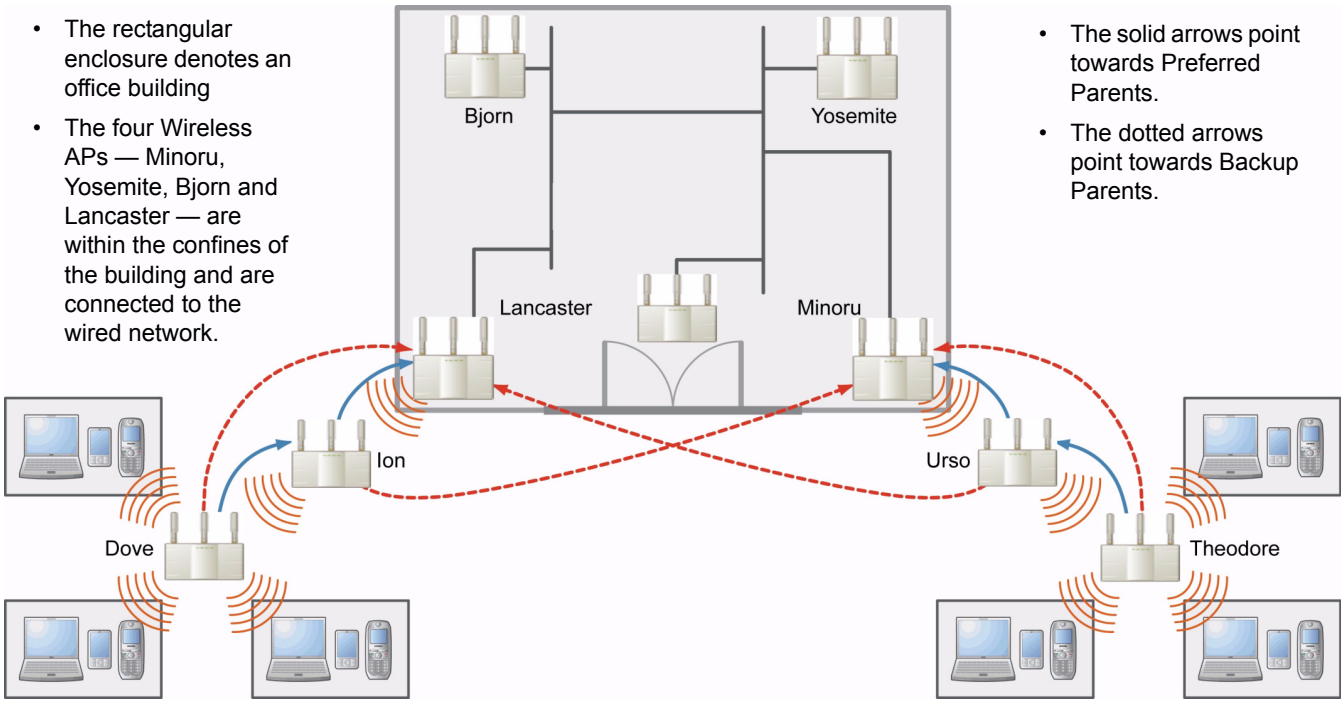
In a traditional WLAN deployment, each radio of the AP can interact with the client devices on a maximum of eight networks.

In a WDS deployment, one of the radios of every WDS AP establishes a WDS link on an exclusive WLAN service. The WDS AP is therefore limited to seven network WLAN services on the WDS radio. The other radio can interact with the client-devices on a maximum of eight WLAN services. The service on which the APs establish the WDS link is called the WDS service.

Note: The Root AP and the Repeater APs can also be configured to interact with the client-devices.

A WDS can be set up by using either a single WDS service or multiple WDS services, as displayed in Figure 5-4 on page 5-4.

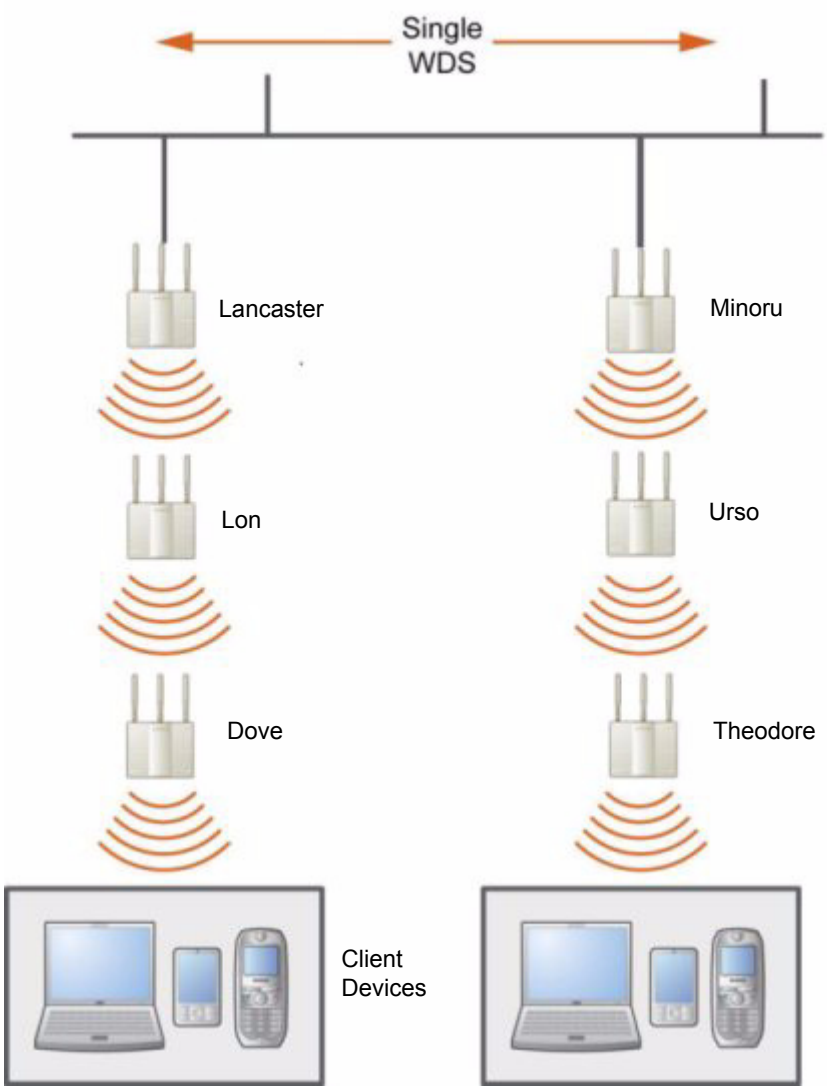
Figure 5-4 Deployment Example


The rectangular enclosure denotes an office building
The four Wireless APs — Minoru, Yosemite, Bjorn and Lancaster — are within the confines of the building and are connected to the wired network.
The solid arrows point towards Preferred Parents.
The dotted arrows point towards Backup Parents.
Bjorn
Yosemite
Lancaster
Minoru
Ion
Urso
Dove
Theodore

WDS Setup with a Single WDS Service

Deploying the WDS in Figure 5-4 on page 5-4 using a single WDS service results in the following structure.

Figure 5-5 WDS Setup with a Single WDS Service

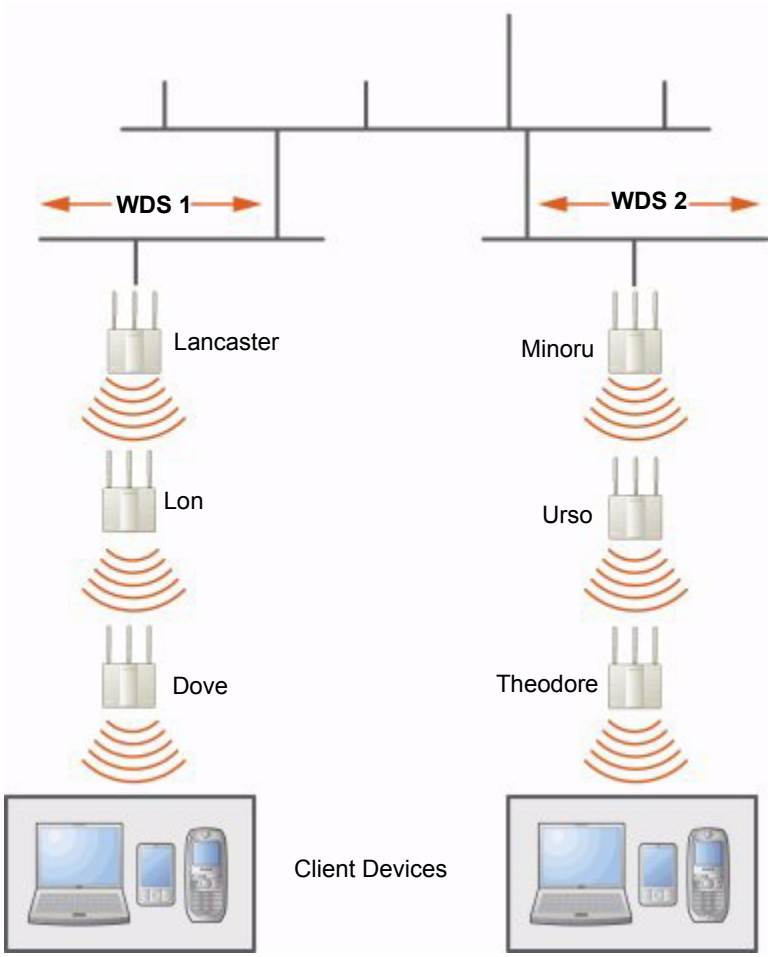


The tree will operate as a single WDS entity. It will have a single WDS SSID and a single pre-shared key for WDS links. This tree will have multiple roots. For more information, see "Multi-Root WDS Topology" on page 5-8.

WDS Setup with Multiple WDS Services

You can also deploy the same WDS in Figure 5-4 on page 5-4 using two WDS services. The two WDS services will create two independent WDS trees. Both the trees will operate on separate SSIDs and use separate pre-shared keys.

Figure 5-6 WDS Setup with Multiple WDS Services



Key Features of WDS

Some key features of WDS are:

- Tree-Like Topology
- Radio Channels
- Multi-Root WDS Topology
- Automatic Discovery of Parent and Backup Parent APs
- Link Security

Tree-Like Topology

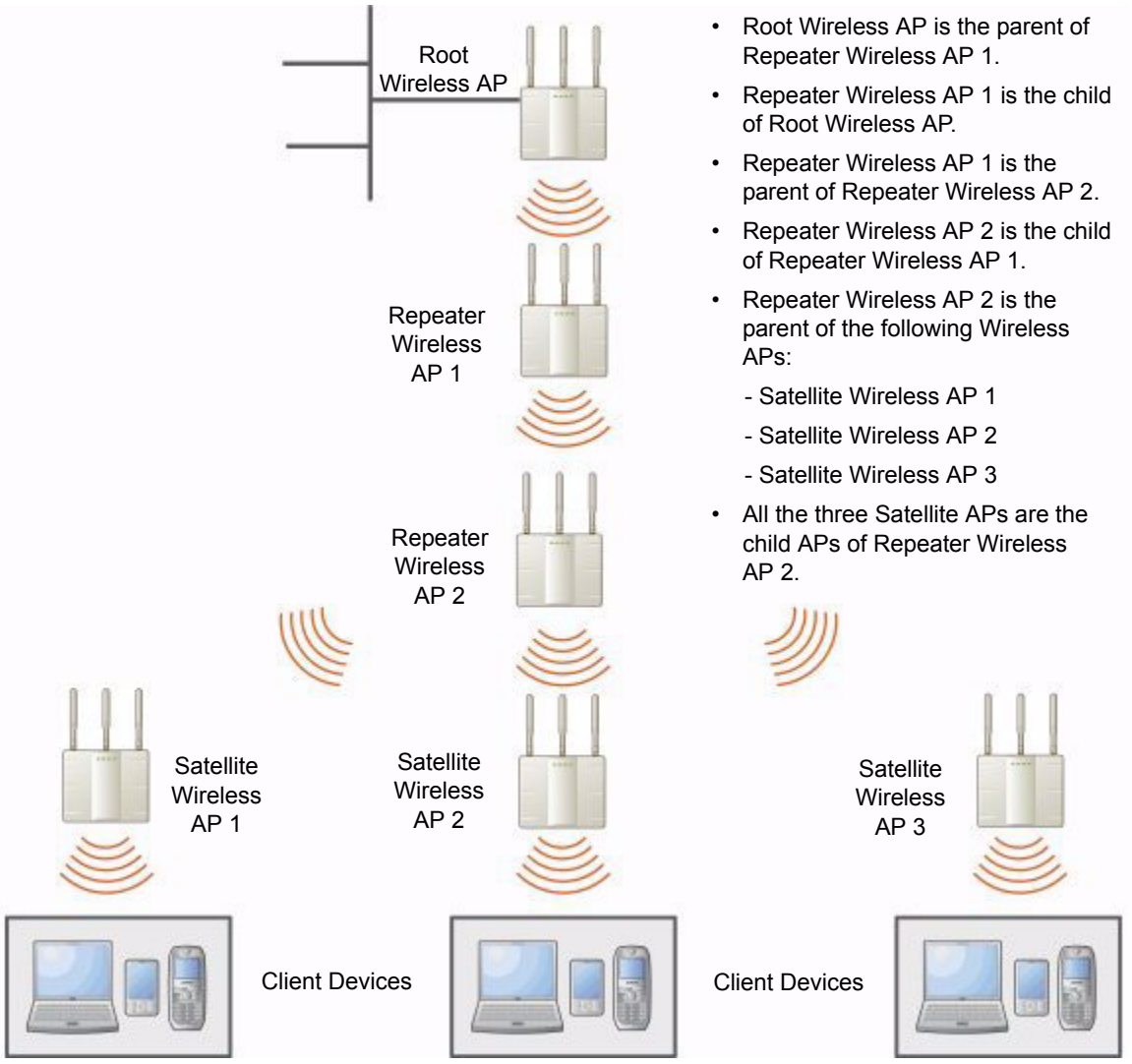
The APs in WDS configuration can be regarded as nodes, and these nodes form a tree-like structure. The tree builds in a top-down manner with the Root AP being the tree root, and the Satellite AP being the tree leaves.

The nodes in the tree-structure have a parent-child relationship. The AP that provides the WDS service to the other APs in the downstream direction is a parent. The APs that establish a link with the AP in the upstream direction for WDS service are children.

If a parent AP fails or stops to act as a parent, the child APs will attempt to discover their backup parents. If the backup parents are not defined, the child APs will be left stranded.

The following figure illustrates the parent-child relationship between the nodes in a WDS topology.

Figure 5-7 Parent-Child Relationship between APs in WDS Configuration


Root
Wireless AP
Repeater
Wireless
AP 1
Repeater
Wireless
AP 2
Satellite
Wireless
AP 1
Satellite
Wireless
AP 2
Satellite
Wireless
AP 3
Client Devices
Client Devices
• Root Wireless AP is the parent of Repeater Wireless AP 1.
• Repeater Wireless AP 1 is the child of Root Wireless AP.
• Repeater Wireless AP 1 is the parent of Repeater Wireless AP 2.
• Repeater Wireless AP 2 is the child of Repeater Wireless AP 1.
• Repeater Wireless AP 2 is the parent of the following Wireless APs:
- Satellite Wireless AP 1
- Satellite Wireless AP 2
- Satellite Wireless AP 3
• All the three Satellite APs are the child APs of Repeater Wireless AP 2.

The Enterasys Wireless Standalone 802.11n AP allows you to configure the AP's role — **parent**, **child** or **both**. If the WDS AP will be serving as a parent and a child in a given topology, its role is configured as **both**.

It is recommended to limit the number of APs participating in a WDS tree to eight. This limit guarantees decent performance in most typical situations.

Radio Channels

The radio channel on which the child AP operates is determined by the parent AP.

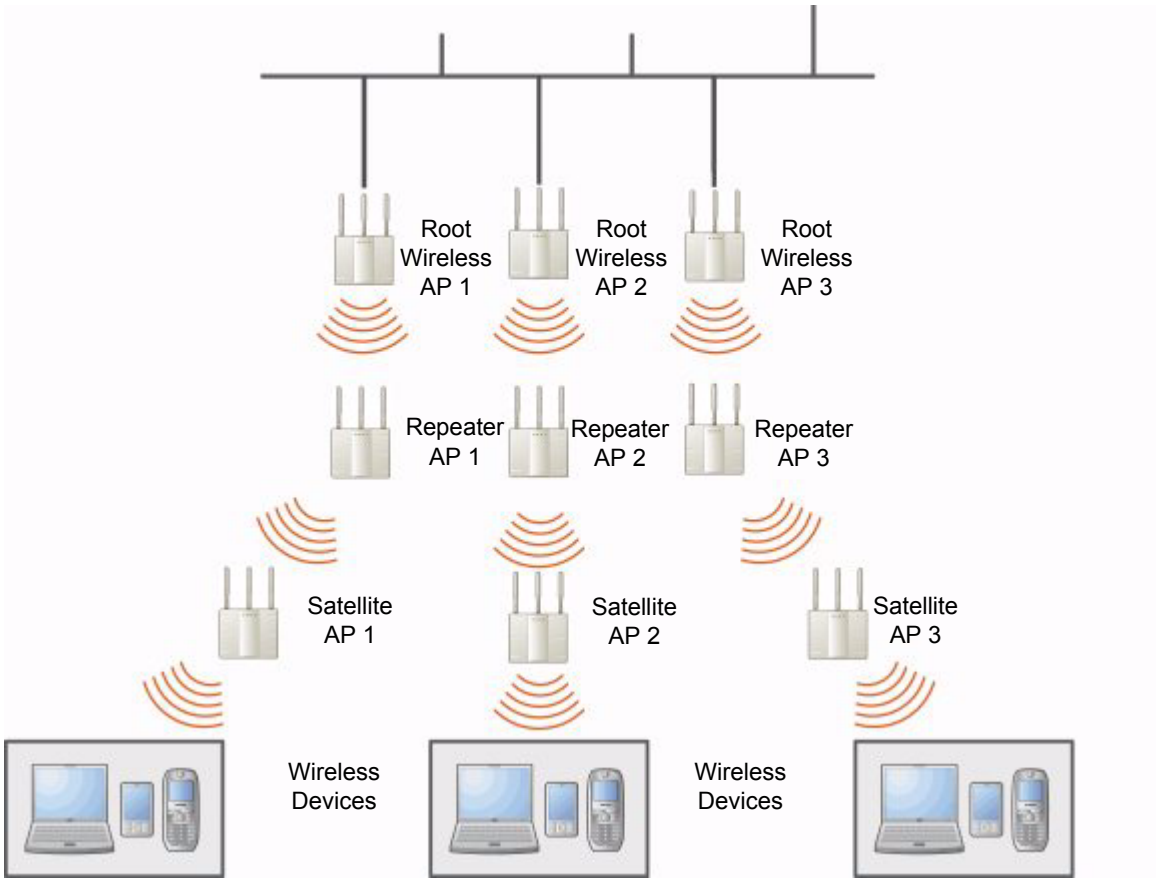
An AP may connect to its parent AP and children APs on the same radio, or on different radios. Similarly, an AP can have two children operating on two different radios.

When an AP is connecting to its parent AP and children APs on the same radio, it uses the same channel for both the connections.

Multi-Root WDS Topology

A WDS topology can have multiple Root APs. Figure 5-8 on page 5-8 illustrates the multiple-root WDS topology.

Figure 5-8 Multiple-Root WDS Topology



Automatic Discovery of Parent and Backup Parent APs

The children APs, including the Repeater AP and the Satellite APs, scan for their respective parents at a startup.

You can configure a parent and backup parent for the children APs. The APs will first try to negotiate a WDS link with the parent AP. If the WDS link negotiation is unsuccessful, the AP will try to negotiate a link with the backup parent.

Link Security

The WDS link is encrypted using Advance Encryption Standard (AES).

Note: The keys for AES are configured prior to deploying the Repeater or Satellite APs.

Before Configuring WDS Services

Before you start configuring the WDS APs, you must ensure the following:

- The APs that are part of the wired WLAN are connected to the wired network.
- The wired AP(s) that will serve as the Root AP(s) of the proposed WDS topology are operating normally.
- The WLAN is operating normally.
- There are no more than eight APs in the WDS.
- MDSU, which is available under Advanced options, is disabled on the radio where the WDS link is configured. Do this to avoid additional latency that may be introduced when MDSU aggregation occurs for a small packet sizes (less than 100 bytes).
- There are no more than two hops between the Satellite and Root APs for ideal performance.
- The WDS APs all participate in the same cluster.

Sketching the WDS Topology

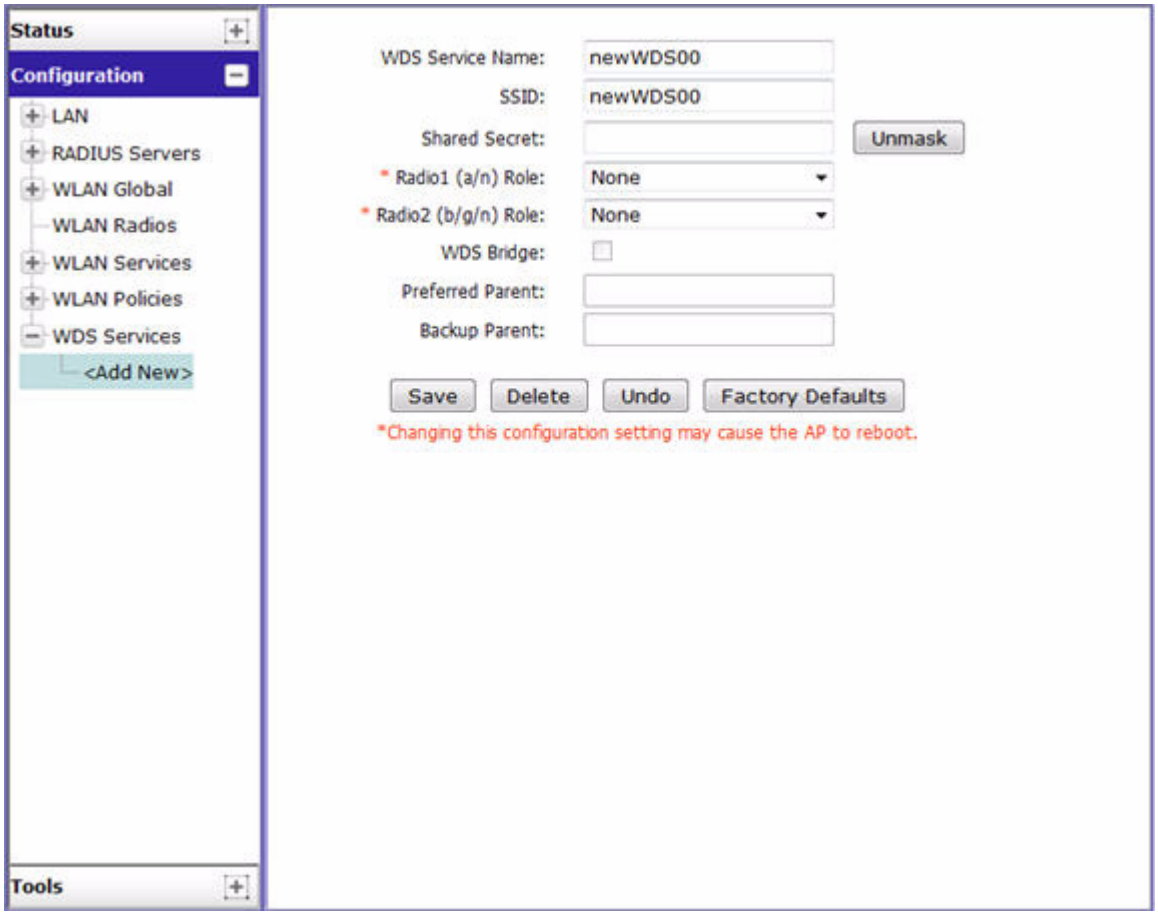
You may sketch the proposed WLAN topology on paper before you start the WDS deployment process. You should clearly identify the following in the sketch:

- WDS APs with their names
- Parent-Child relationships between APs
- Radios that you will choose to link the AP's parents and children

Configuring a WDS Service

To configure the WDS, you must identify and mark the Preferred Parents, Backup Parents and the Child APs in the proposed WDS topology before starting the configuration process.

To display the WDS Services settings, select **Configuration** from the left pane and expand the **WDS Services** node. Select the WDS service you want to edit or select **<Add New>**. The WDS Services configuration displays in the right pane.



Field	Description
WDS Service Name	Enter a name for the WDS service. The name can contain up to 63 characters.
SSID	Enter the SSID. The **SSID** field is automatically filled in with the name, but you can change it if desired. **Note:** The SSID of a WDS child must be the same as the preferred parent and backup parent.
Shared Secret	Enter the Shared Secret. The WDS APs use this pre-shared key to establish a WDS link between them. The pre-shared key must be 8 to 63 characters long.
Unmask	Click to display the value entered in the **Shared Secret** field.

Field	Description
Radio 1 (a/n) Role	Select the role of radio 1. Options include: • **None** (default) - WDS service is not activated on this radio. • **Child** - This radio will serve as a Child only. • **Parent** - This radio will serve as a Parent only. • **Both** - The radio will serve as both Child and Parent.
Radio 2 (b/g/n) Role	Select the role of radio 2. Options include: • **None** (default) - WDS service is not activated on this radio. • **Child** - This radio will serve as a Child only. • **Parent** - This radio will serve as a Parent only. • **Both** - The radio will serve as both Child and Parent.
WDS Bridge	Select this checkbox when you want to bridge the wired network over the WDS link. When selected enables the Ethernet connector on the WDS child AP that is connected to the wired network. For more information, see “Wireless Bridge Configuration” on page 5-3.
Preferred Parent	If this AP will serve as a child to a parent AP, enter the AP Name of the AP that will serve as the parent.
Backup Parent	If this AP will serve as a child to a parent AP, enter the AP Name of the AP that will serve as a backup to the preferred parent.
Function Buttons	
Save	Click to save your changes.
Delete	Click to delete the WDS.
Undo	Click to display the most recently saved values for the settings on this screen.
Factory Defaults	Click to display the factory defaults on this screen.The factory defaults are not applied until you click Save.

To configure WDS services on the AP:

1. (Optional) Change the **WDS Service Name**.
2. (Optional) Change the **SSID**.
3. Enter the **Shared Secret**. Click **Unmask** to view and proofread the **Shared Secret**.
4. Select a role for one or both radios from their respective drop-down menu.
5. (Optional) Select the **WDS Bridge** checkbox.
6. Select the **Preferred Parent** AP.
7. (Optional) Select the **Backup Parent** AP.
8. Click **Save** to save your changes.

   Configure each additional AP participating in the WDS by repeating Step 1 through Step 8 until all APs are configured according to your proposed WDS topology.

Deploying the WDS

Once all of the APs that will participate in the WDS are configured, you can physically place the APs in their intended location and power them on. Each AP is equipped with WDS signal strength mode. WDS signal strength mode displays the strength of the signal between parent and child AP using the APs LEDs, allowing you to position each AP's antennas without having to log in to each AP. For more information about WDS signal strength mode, see "WDS Signal Strength Mode LED Behavior" on page A-7.

To deploy the WDS:

1. (Optional) Place each AP in **WDS Signal Strength LED** mode as described in "Configuring General LAN Settings" on page 4-2.
2. Power down the APs and move each to their intended physical location.
3. Power up each AP and adjust the antennas, using the LEDs to display the WDS signal strength.

6

Viewing Wireless Access Point Information

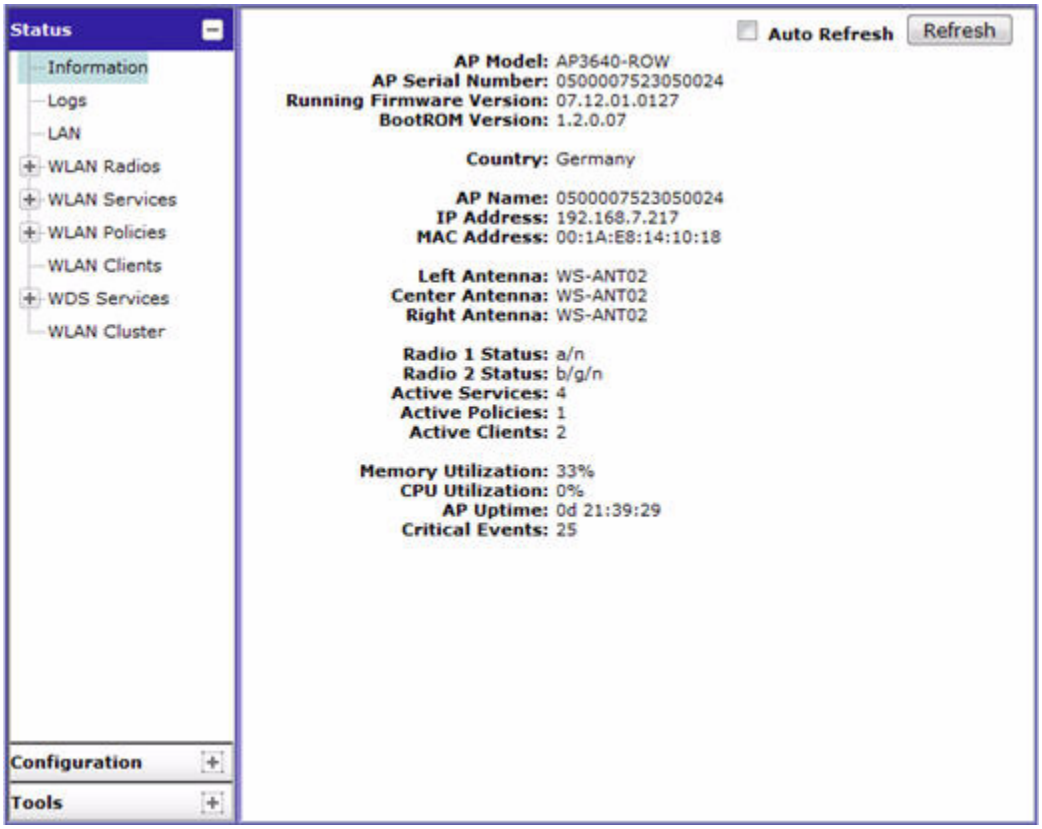
This chapter describes how to display information about the AP.

For information about...	Refer to page...
Viewing AP General Information	6-1
Viewing AP Logs	6-2
Viewing LAN Status Information	6-4
Viewing WLAN Radio Information	6-5
Viewing General Information about a WLAN Service	6-7
Viewing General Information about a WLAN Policy	6-8
Viewing WLAN Clients Information	6-9
Viewing WDS Services Information	6-13
Viewing WLAN Cluster Information	6-14

Viewing AP General Information

The AP General Information view provides fast access to commonly needed information — such as the AP's model and serial number, Firmware and BootROM version, IP address information, antenna types and location, radio status, and active services, policies, and clients.

To access the AP General Information view, navigate to **Status** > **Information**. General information about the AP displays in the right pane.



To refresh the view, click **Refresh** or select the **Auto Refresh** checkbox located in the top right corner of pane. The information on the page refreshes every 15 seconds.

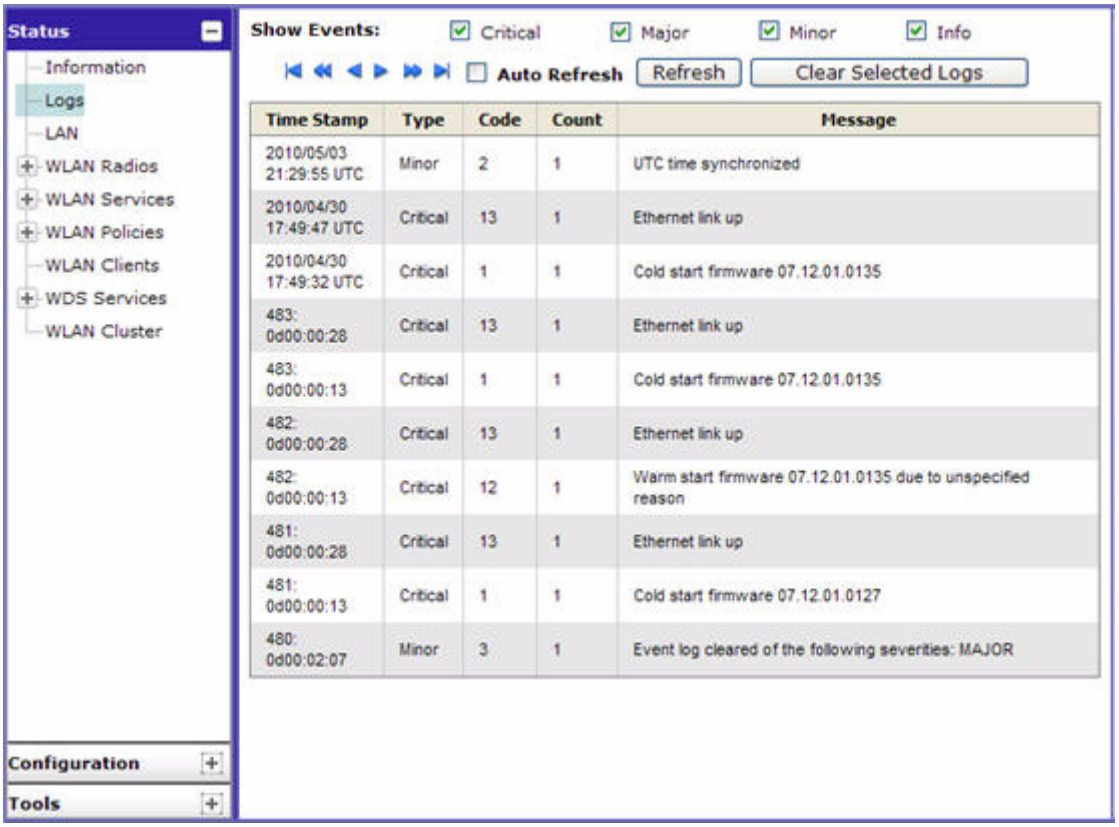
Viewing AP Logs

The Logs view displays the contents of the flash-based log file in an easy-to-read format. Each log entry is displayed on a separate line. You can view the following log status information:

- The timestamp within the session, displayed in days, hours, minutes and seconds since the session started, or if an NTP server is specified, displays the real-time.
- An event code.
- A log message event description containing text and optional parameters. For example, MAC and IP addresses.

Note: The log can display more than 32000 events.

To access the AP Log view, navigate to **Status** > **Logs**. The Log list displays in the right pane.

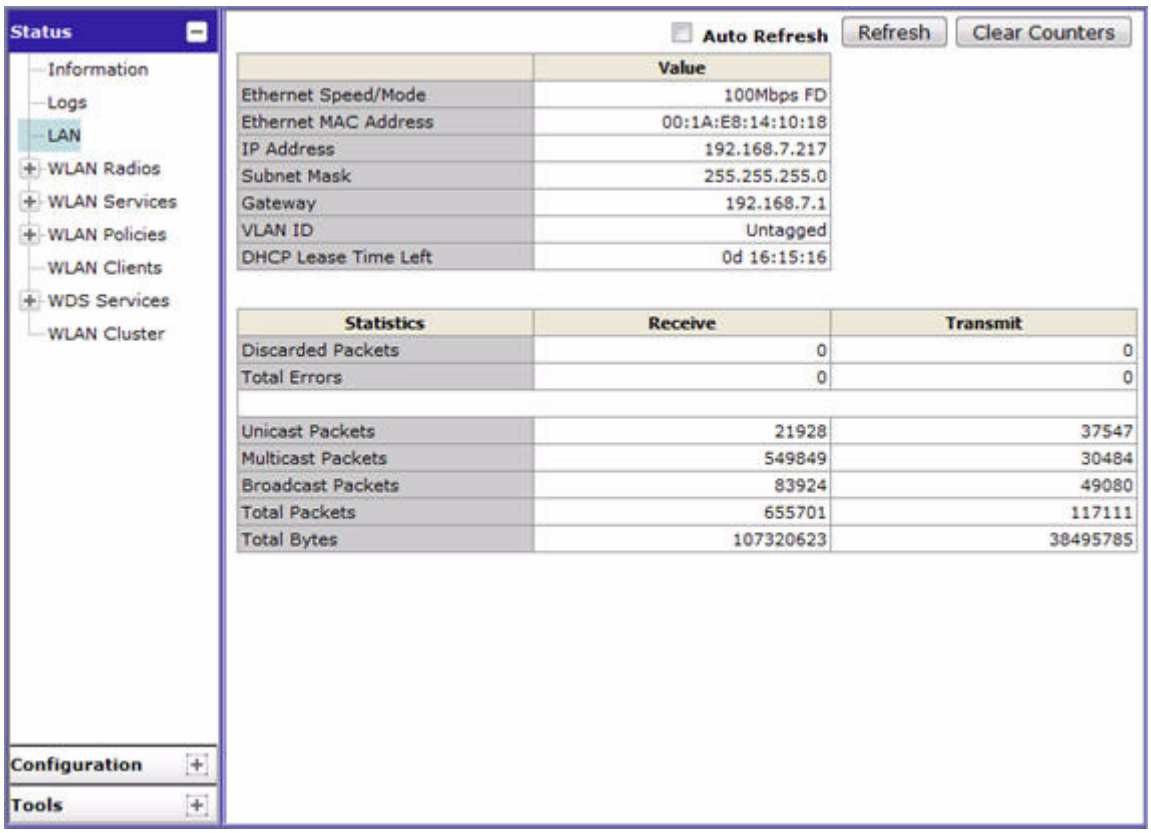

Status
Information
Logs
LAN
WLAN Radios
WLAN Services
WLAN Policies
WLAN Clients
WDS Services
WLAN Cluster
Configuration
Tools
Show Events:
Critical
Major
Minor
Info
Auto Refresh
Refresh
Clear Selected Logs
Time Stamp | Type | Code | Count | Message
2010/05/03 21:29:55 UTC | Minor | 2 | 1 | UTC time synchronized
2010/04/30 17:49:47 UTC | Critical | 13 | 1 | Ethernet link up
2010/04/30 17:49:32 UTC | Critical | 1 | 1 | Cold start firmware 07.12.01.0135
483: 0d00:00:28 | Critical | 13 | 1 | Ethernet link up
483: 0d00:00:13 | Critical | 1 | 1 | Cold start firmware 07.12.01.0135
482: 0d00:00:28 | Critical | 13 | 1 | Ethernet link up
482: 0d00:00:13 | Critical | 12 | 1 | Warm start firmware 07.12.01.0135 due to unspecified reason
481: 0d00:00:28 | Critical | 13 | 1 | Ethernet link up
481: 0d00:00:13 | Critical | 1 | 1 | Cold start firmware 07.12.01.0127
480: 0d00:02:07 | Minor | 3 | 1 | Event log cleared of the following severities: MAJOR

- Filter the type of events displayed by selecting or deselecting the appropriate check boxes next to **Show Events**. By default, all types of events are displayed.
- Click **Clear Selected Logs** to delete the logs selected next to **Show Events**.
- To refresh the view, click **Refresh** or select the **Auto Refresh** checkbox located in the top right corner of pane. The information on the page refreshes every 15 seconds.
- Use the various arrow buttons to navigate through the Log pages.

Viewing LAN Status Information

The LAN Status view displays information about the LAN — such as Ethernet speed, MAC address, IP address, Subnet Mask, Gateway, DHCP Lease Time Left, and receive and transmit statistics.

To access the LAN status view, navigate to **Status** > **LAN**. LAN status information displays in the right pane.



- To refresh the view, click **Refresh** or select the **Auto Refresh** checkbox located in the top right corner of pane. The information on the page refreshes every 15 seconds.
- Click **Clear Counters** to reset currently displayed counters.

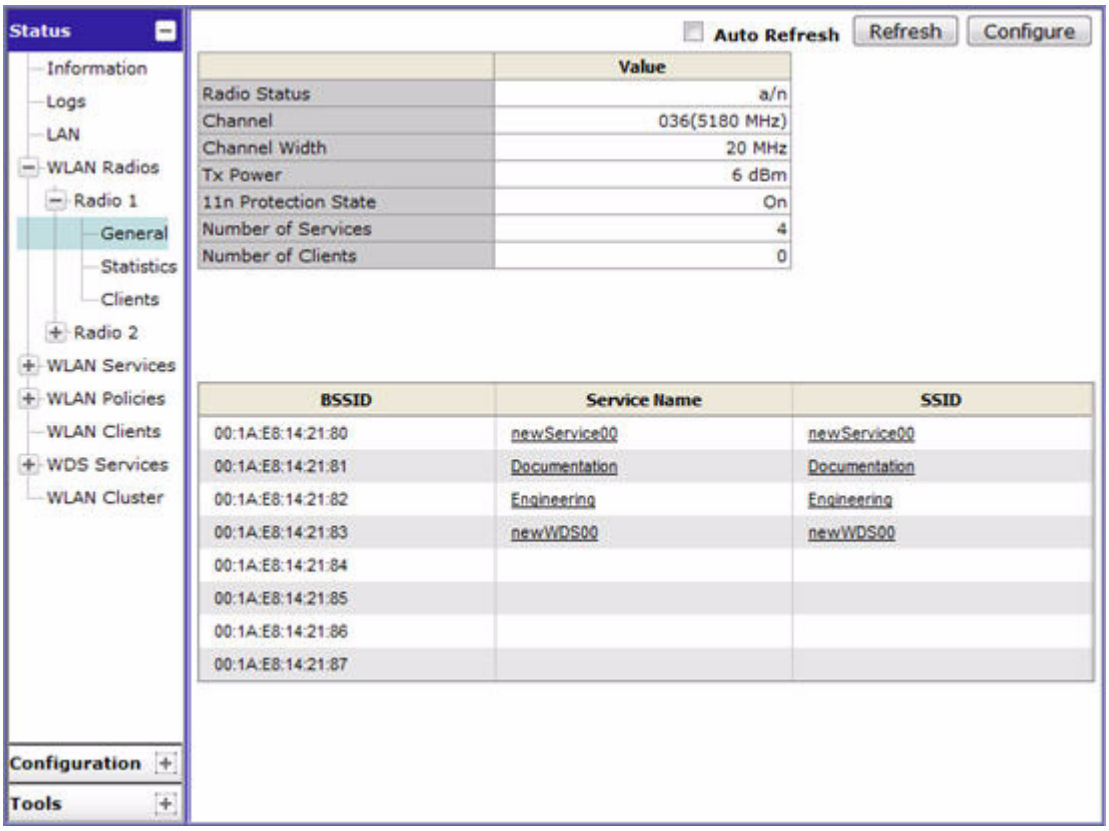
Viewing WLAN Radio Information

The AP provides informative views for both radios. The following sections discuss the WLAN Radio views.

Viewing General Information for a Radio

You can view general status information for each radio — such as Channel, Channel Width, Tx Power, 11n Protection state, number of services, and the number of clients.

To access the general status view for a radio, navigate to **Status** > **WLAN Radios**, expand the desired Radio node, and select **General**. General information for the selected radio displays in the right pane.

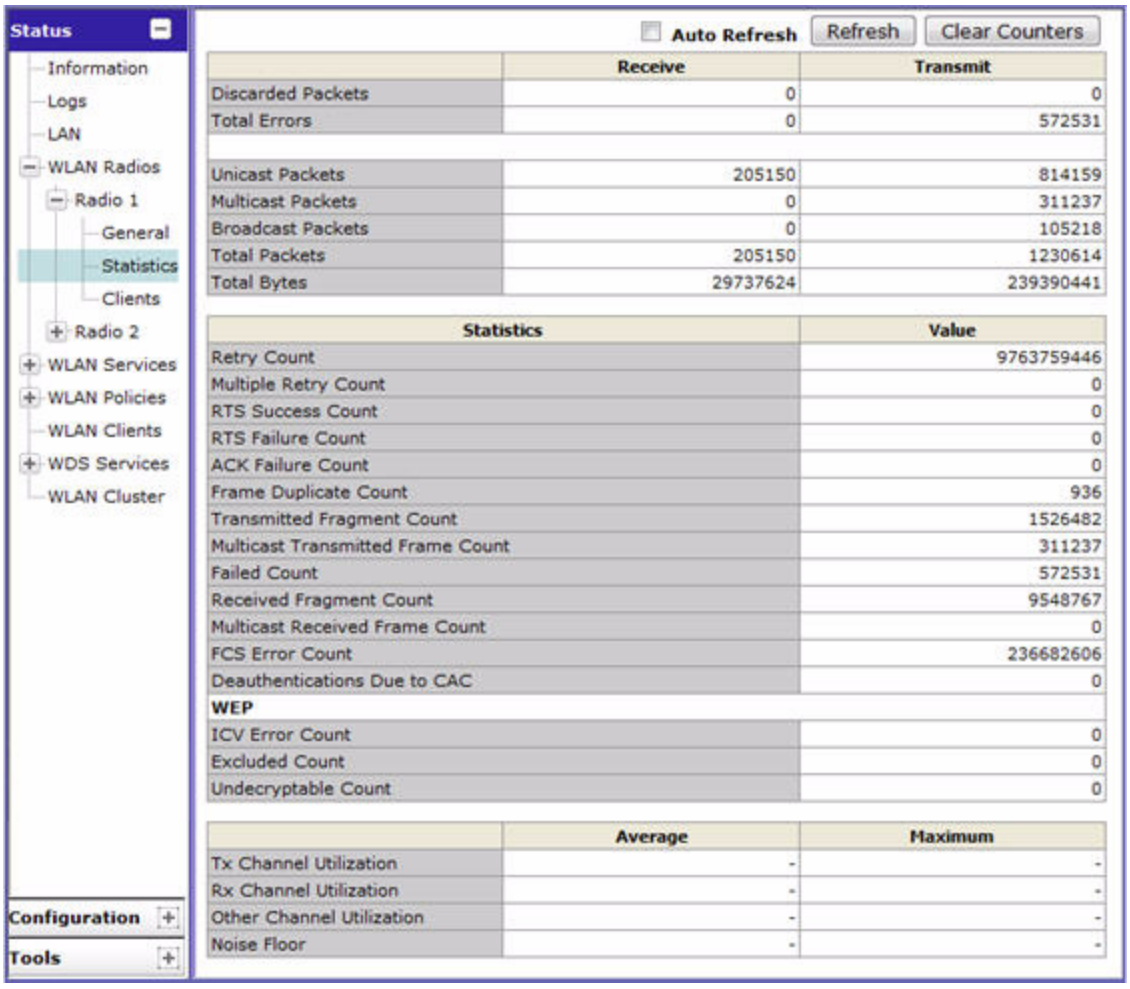


- To refresh the view, click **Refresh** or select the **Auto Refresh** checkbox located in the top right corner of pane. The information on the page refreshes every 15 seconds.
- Click **Configure** to leave this view and access the WLAN Radios configuration for the selected radio.
- Click a service name or SSID to view statistics for the selected service.

Viewing Statistics for a Radio

You can view detailed statics for each radio.

To access the Statistics view for a radio, expand **Status** from the left pane, expand the **WLAN Radios** node, expand the desired Radio node, and select **Statistics**. Statistics for the selected radio display in the right pane.



	Receive	Transmit
Discarded Packets	0	0
Total Errors	0	572531
Unicast Packets	205150	814159
Multicast Packets	0	311237
Broadcast Packets	0	105218
Total Packets	205150	1230614
Total Bytes	29737624	239390441

Statistics	Value
Retry Count	9763759446
Multiple Retry Count	0
RTS Success Count	0
RTS Failure Count	0
ACK Failure Count	0
Frame Duplicate Count	936
Transmitted Fragment Count	1526482
Multicast Transmitted Frame Count	311237
Failed Count	572531
Received Fragment Count	9548767
Multicast Received Frame Count	0
FCS Error Count	236682606
Deauthentications Due to CAC	0
WEP	
ICV Error Count	0
Excluded Count	0
Undecryptable Count	0

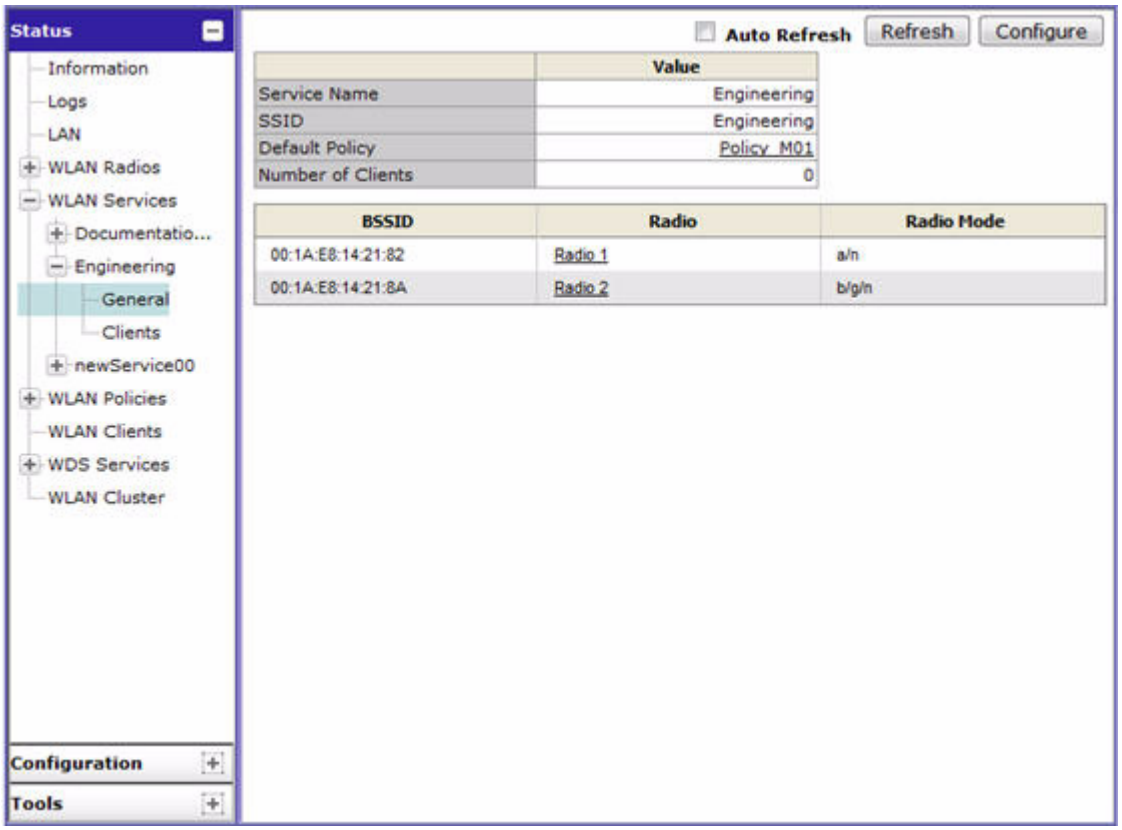
	Average	Maximum
Tx Channel Utilization	-	-
Rx Channel Utilization	-	-
Other Channel Utilization	-	-
Noise Floor	-	-

- To refresh the view, click **Refresh** or select the **Auto Refresh** checkbox located in the top right corner of pane. The information on the page refreshes every 15 seconds.
- Click **Clear Counters** to reset currently displayed counters.

Viewing General Information about a WLAN Service

The WLAN Service General Information view displays basic status information for a WLAN service, such as Service Name, SSID, Default Policy, VLAN ID, and Number of Clients.

To access the general status view for a WLAN service, expand **Status** from the left pane, expand the **WLAN Services** node, expand the desired WLAN service node, and select **General**. General status for the selected WLAN service displays in the right pane.

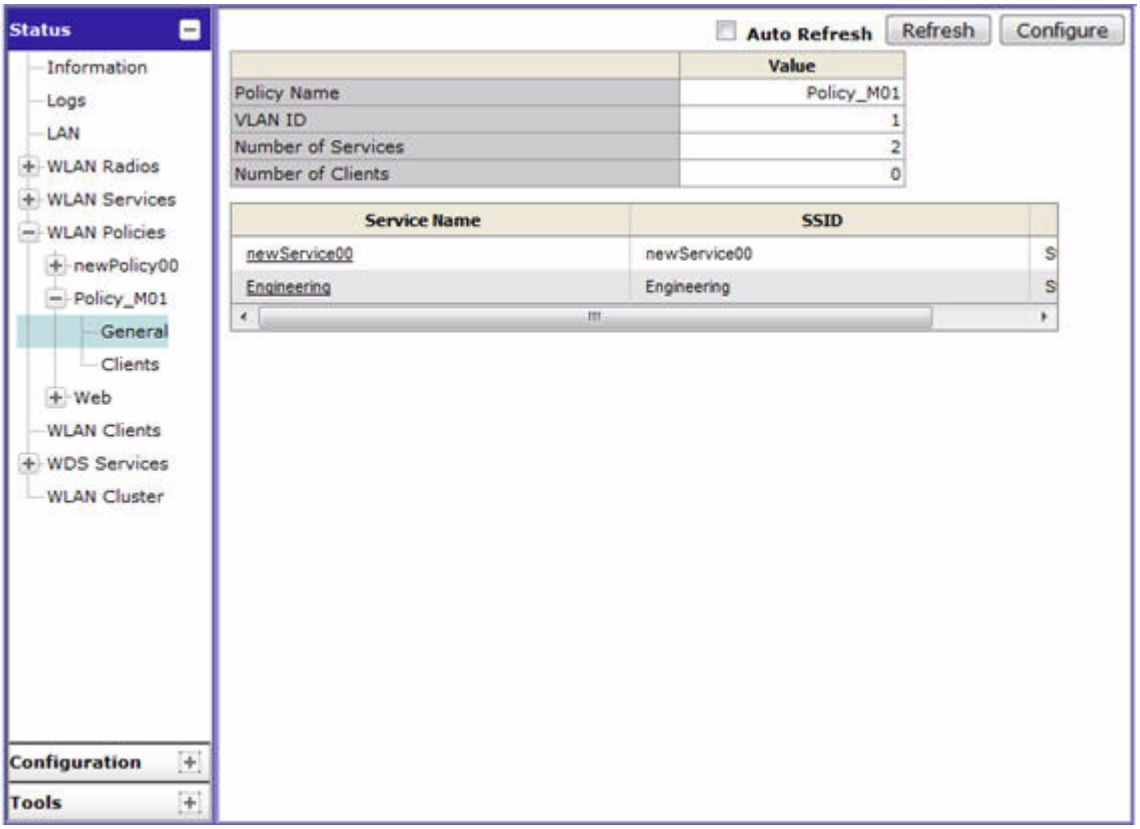


- To refresh the view, click **Refresh** or select the **Auto Refresh** checkbox located in the top right corner of pane. The information on the page refreshes every 15 seconds.
- Click **Configure** to leave this view and access the WLAN service configuration for the selected WLAN service.
- Click the default policy name to view statistics for the policy.
- Click a radio to view statistics for the selected radio.

Viewing General Information about a WLAN Policy

The WLAN Policy General Information view displays basic status information for a WLAN policy, such as Policy Name, VLAN ID, Number of Services, and Number of Clients.

To access the general information view for a WLAN policy, navigate to **Status** > **WLAN Policies**, expand the desired policy node, and select **General**. General status for the selected policy displays in the right pane.



- To refresh the view, click **Refresh** or select the **Auto Refresh** checkbox located in the top right corner of pane. The information on the page refreshes every 15 seconds.
- Click **Configure** to leave this view and access the WLAN service configuration for the selected WLAN service.
- Click on a service name to view statistics for the selected service.

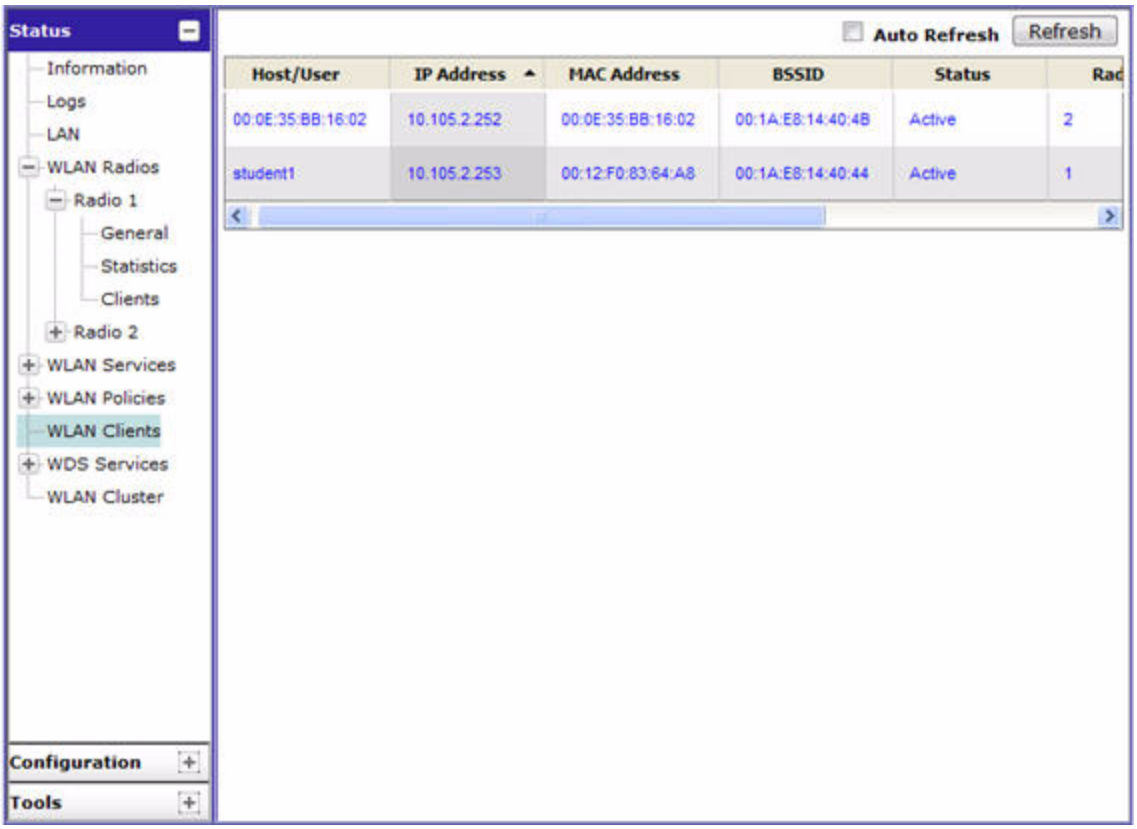
Viewing WLAN Clients Information

The AP provides you with several client view options. Depending on the type of information you seek, you can view all clients connected to the AP or you can view clients by Radio, Policy, or Service.

Viewing All Clients

The WLAN Clients status view displays information for all connected WLAN clients — such as Host or User, IP address, MAC address, BSSID, Status, Radio, Service, and Policy.

To access the client status of all connected clients, navigate to **Status** > **WLAN Clients**. The status of all connected clients displays in the right pane.

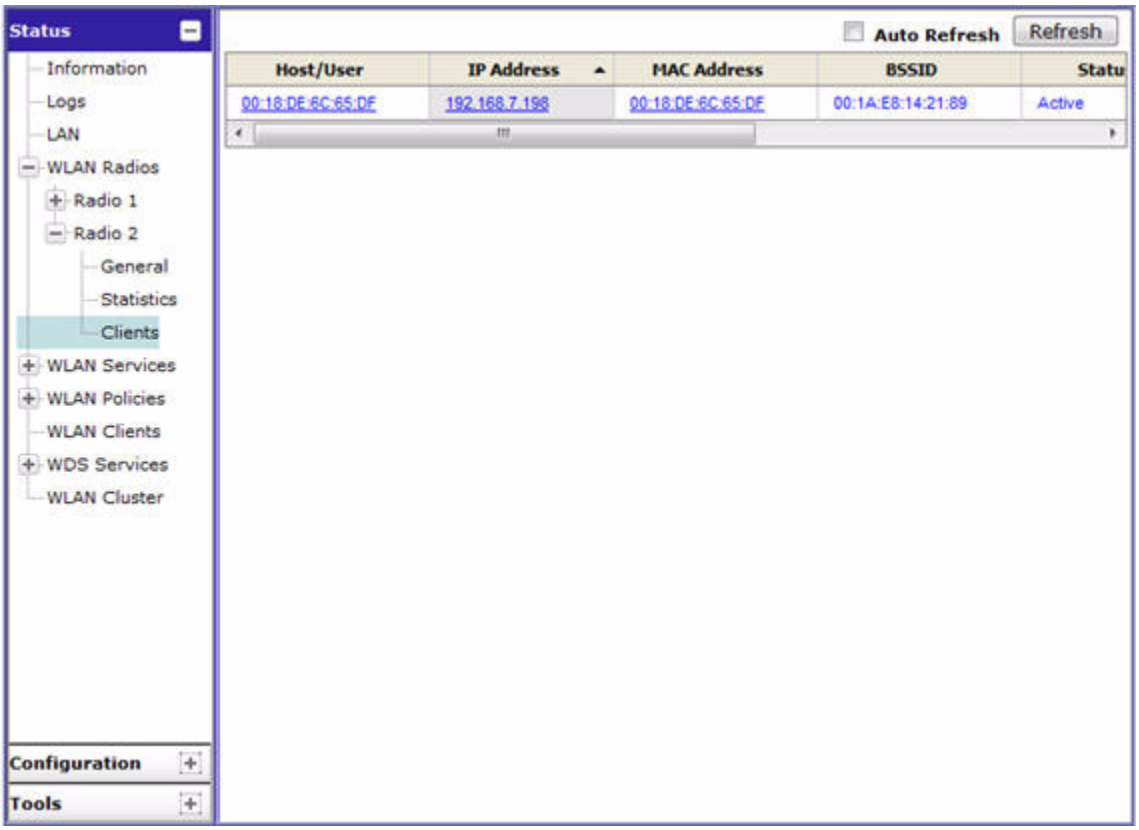


To refresh the view, click **Refresh** or select the **Auto Refresh** checkbox located in the top right corner of pane. The information on the page refreshes every 15 seconds.

Viewing Clients by Radio

Each WLAN Radio provides you with information about the clients connected — such as Host or User, IP address, MAC address, BSSID, Status, Service, and Policy.

To access the client status view for a radio, navigate to **Status** > **WLAN Radios**, expand the desired radio node, and select **Clients**. Client status for the selected radio displays in the right pane.

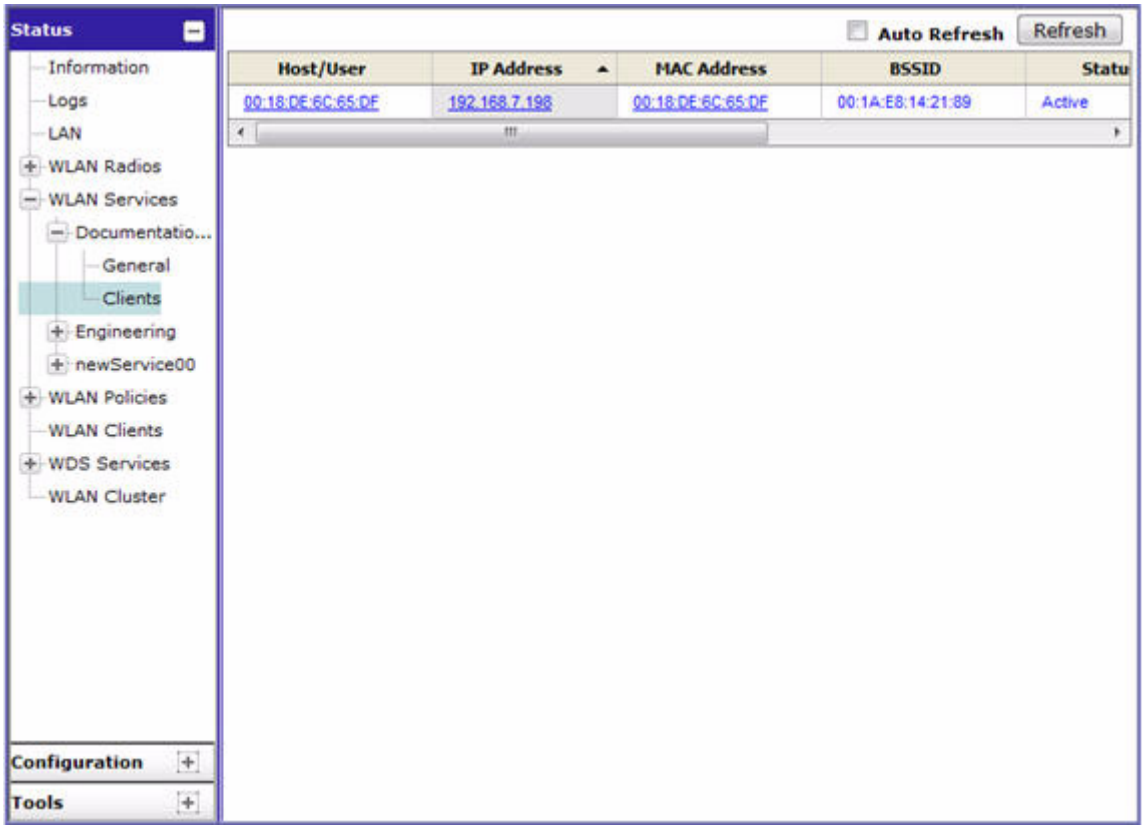


To refresh the view, click **Refresh** or select the **Auto Refresh** checkbox located in the top right corner of pane. The information on the page refreshes every 15 seconds.

Viewing Clients by WLAN Service

Each WLAN service provides you with information about the clients using the selected service — such as Host or User, IP address, MAC address, BSSID, Status, Radio, and Policy.

To access the client status view for a WLAN service, navigate to **Status** > **WLAN Services**, expand the desired WLAN service node, and select **Clients**. Client status for the selected WLAN service displays in the right pane.

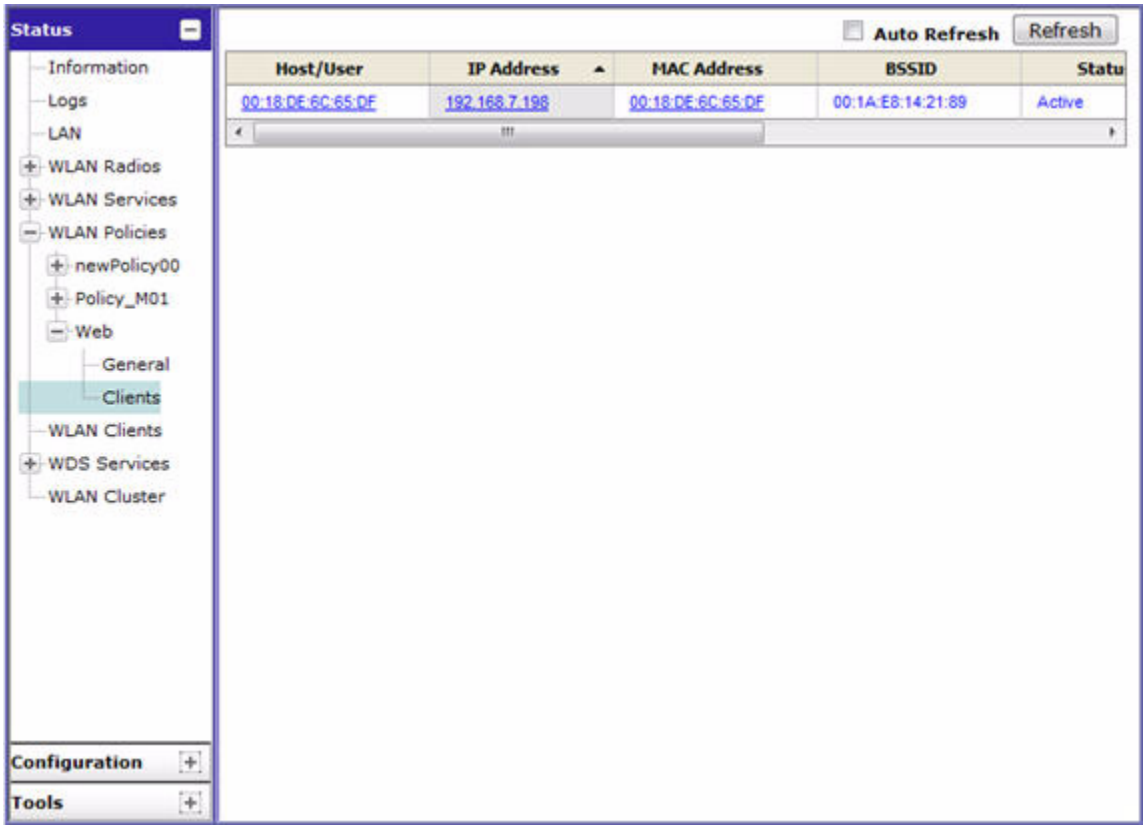


To refresh the view, click **Refresh** or select the **Auto Refresh** checkbox located in the top right corner of pane. The information on the page refreshes every 15 seconds.

Viewing Clients by WLAN Policy

Each WLAN policy provides you with information about the clients using the selected service — such as Host or User, IP address, MAC address, BSSID, Status, Radio, and Service.

To access the client status view for a WLAN policy, navigate to **Status** > **WLAN Policies**, expand the desired policy node, and select **Clients**. Client status for the selected policy displays in the right pane.

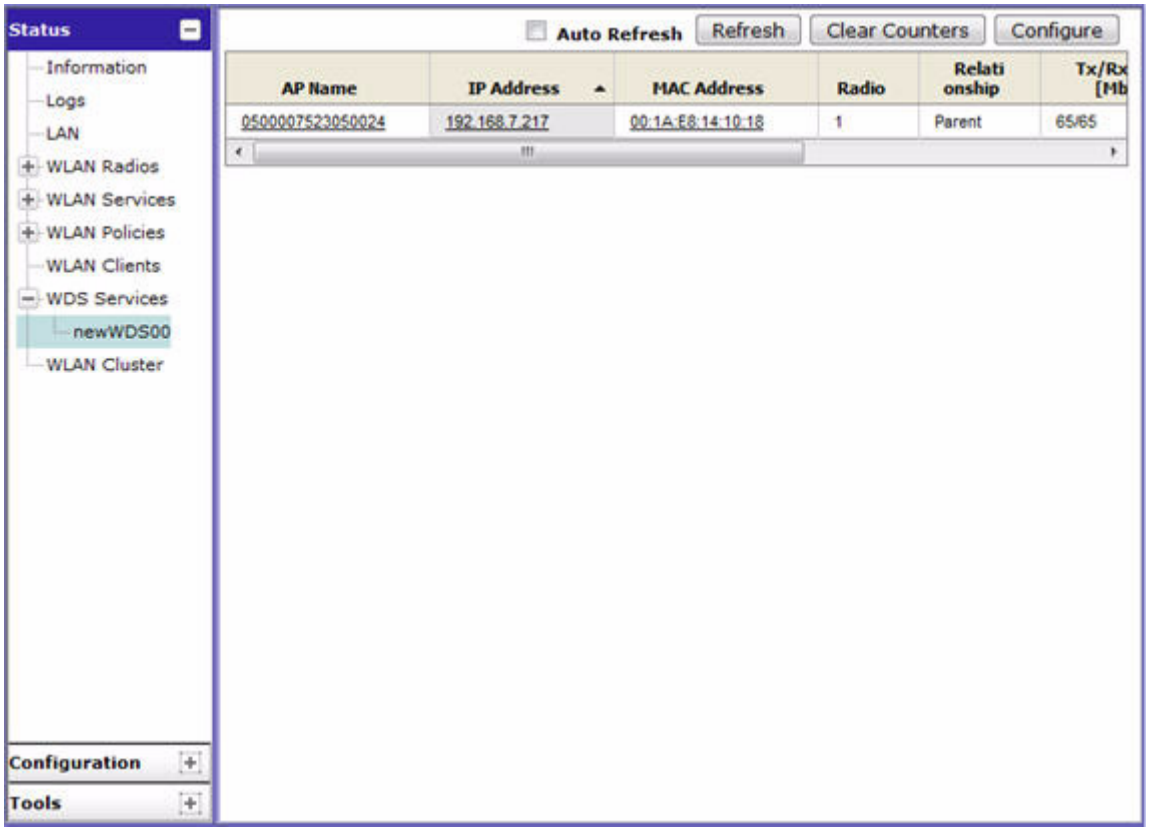


- To refresh the view, click **Refresh** or select the **Auto Refresh** checkbox located in the top right corner of pane. The information on the page refreshes every 15 seconds.

Viewing WDS Services Information

The WDS Services Information view displays information about the status of WDS APs for a selected WDS — such as AP name, IP address, MAC address, Radio, and Relationship, as well as various statistics.

To access the WDS Services Information view for a WDS, navigate to **Status** > **WDS Services**, and select the desired WDS service. Information about the selected WDS service displays in the right pane.

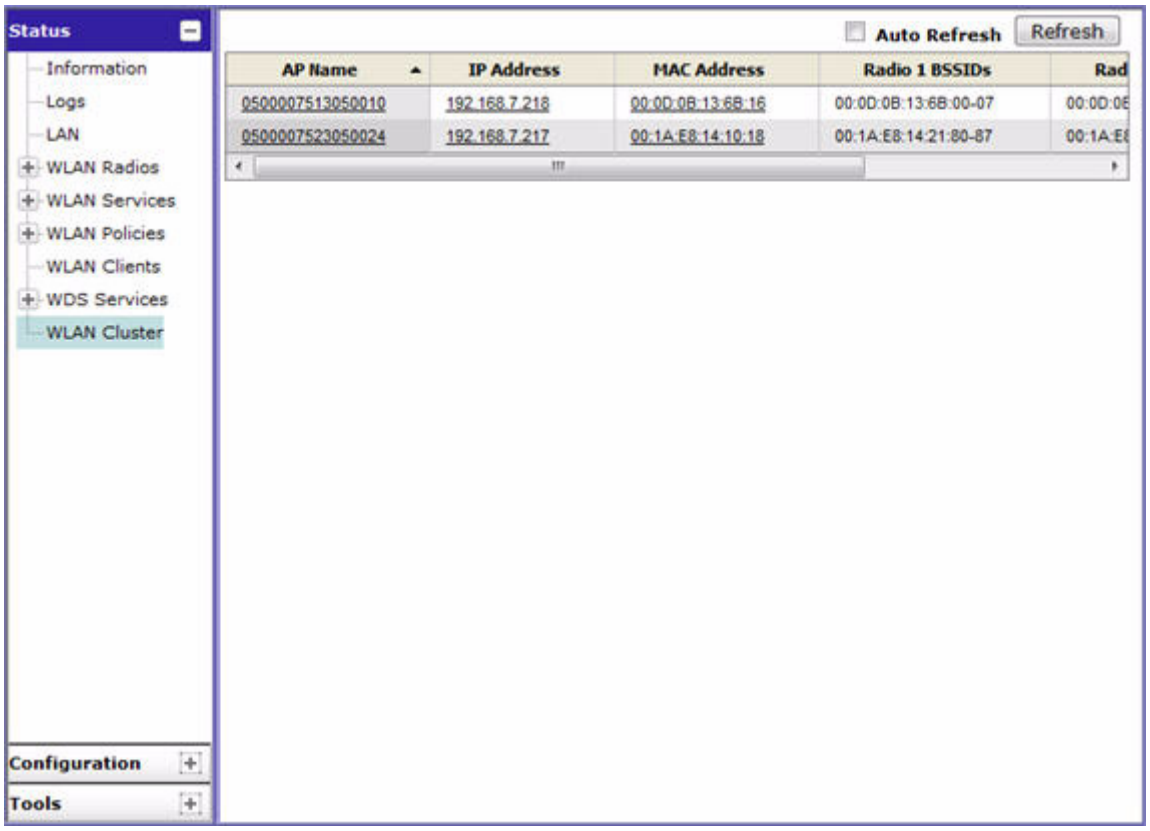


- To refresh the view, click **Refresh** or select the **Auto Refresh** checkbox located in the top right corner of pane. The information on the page refreshes every 15 seconds.
- Click **Clear Counters** to zero the **Receive** and **Transmit** statistics in the bottom table.
- Click **Configure** to leave this view and access the WDS configuration for the selected WDS.

Viewing WLAN Cluster Information

The WLAN Cluster information view displays information about the cluster — such as AP name, IP address, MAC address, Radio BSSIDs, and clients.

To access the WLAN Cluster information view, navigate to **Status** > **WLAN Cluster**. Information about the cluster displays in the right pane.



To refresh the view, click **Refresh** or select the **Auto Refresh** checkbox located in the top right corner of pane. The information on the page refreshes every 15 seconds.

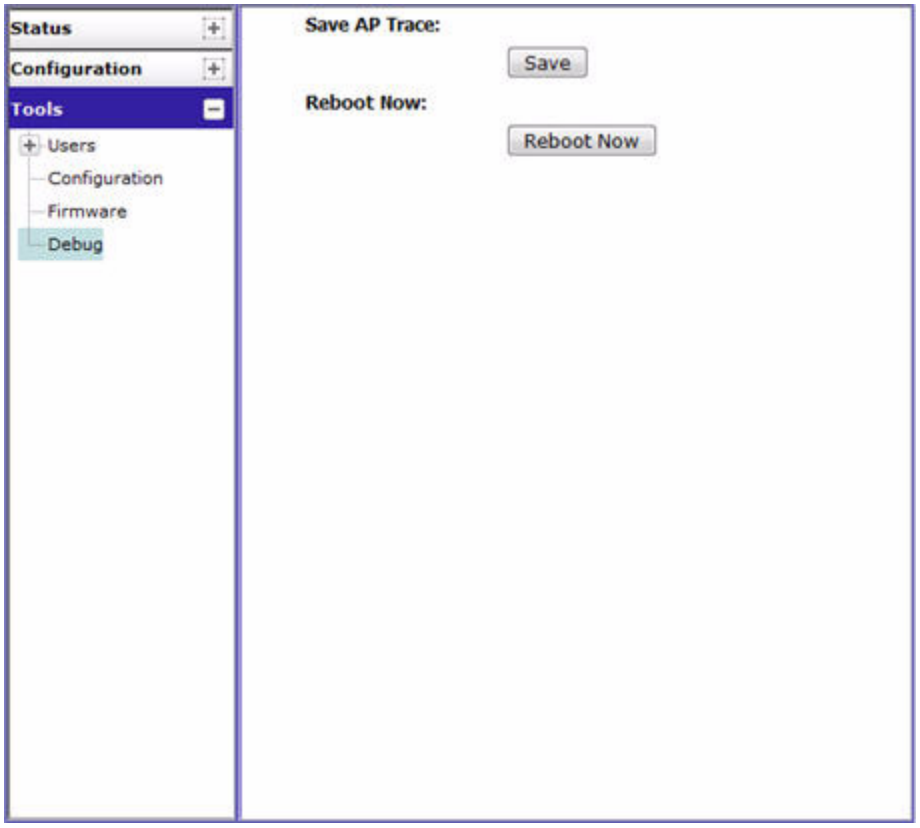
A

Troubleshooting

For information about...	Refer to page...
Rebooting the AP	A-1
Restoring the AP to Factory Default Settings	A-4
Exporting and Importing Configuration	A-2
LED Behavior	A-5

Rebooting the AP

To display the reboot now option, navigate to **Tools** > **Debug**. The Debug tools display in the right pane.



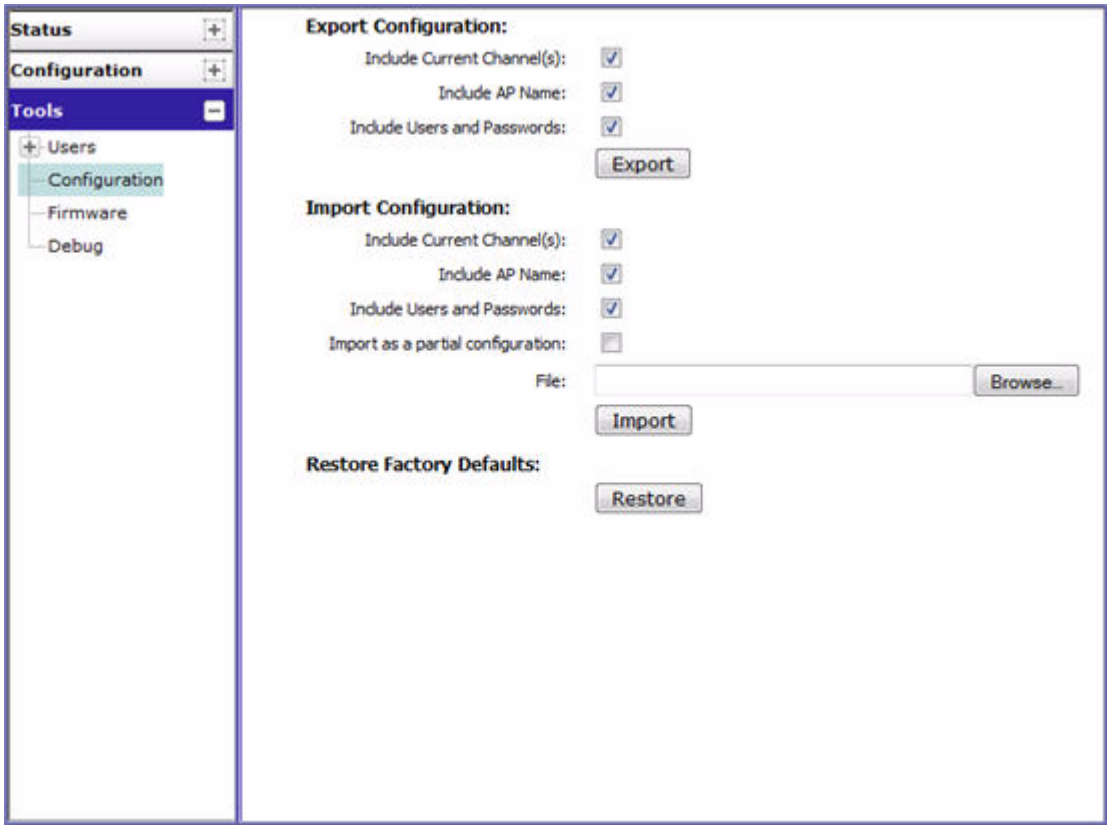
Field	Description
Save AP Trace	
Save	Click to save a zipped file that contains the AP's log, a crash report, and a core dump file.
Reboot Now	
Reboot Now	Click to power cycle the AP.

Click **Reboot Now**. The AP logs you out and reboots.

Exporting and Importing Configuration

APs are configured with default settings from the factory. You can modify an AP's running configuration and export it to a text file. You can then import the saved configuration to newly added APs.

To export or import a configuration, navigate to **Tools** > **Configuration**. The Configuration tools display in the right pane.



Field	Description
Export Configuration	
Include Current Channel(s)	Deselect this checkbox if you do not want to include the current channel(s) in the configuration file.
Include AP Name	Deselect this checkbox if you do not want to include the AP names with the configuration file.

Field	Description
Include Users and Passwords	Deselect this checkbox if you do not want to include user accounts and passwords in the configuration file.
Export	Click to export the configuration file. Upon clicking **Export**, the AP creates a new tab in your Web browser or opens a new browser window (depending on your browser configuration) that displays the APs configuration in text format.
Import Configurations	
Include Current Channel(s)	Deselect this checkbox if you do not want to extract the current channel(s) from the configuration file.
Include AP Name	Deselect this checkbox if you do not want to extract the AP names from the configuration file.
Include Users and Passwords	Deselect this checkbox if you do not want to extract user accounts and passwords from the configuration file.
Import as a partial configuration	Select to merge the current configuration with the imported configuration file.
File	Enter the location of the configuration file to import.
Browse	Click to browse for the configuration file to import.
Import	Click to import the configuration file specified in the **File** field.
Restore Factory Defaults	
Restore	Click to restore the AP to factory default settings.

To export the AP configuration:

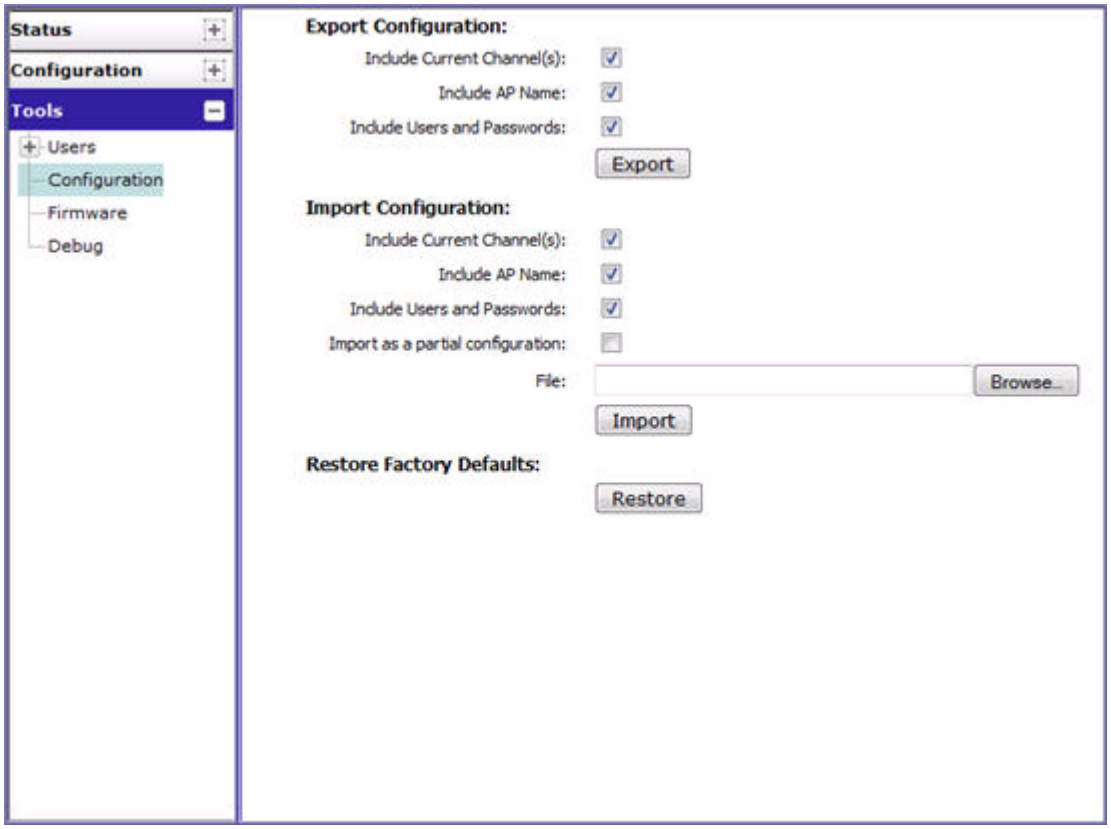
1. (Optional) Deselect the checkboxes of the attributes you want to withhold from exporting.
2. Click **Export** to display the AP's configuration in either a new Web browser window or a new browser tab (depending on your browser settings).

To import a configuration to your AP:

1. (Optional) Deselect the checkboxes of the attributes you want to withhold from exporting.
2. (Optional) Select the **Import as a partial configuration** checkbox.
3. Click **Browse** to open a navigation window.
4. Select the configuration file and click **Open**.
5. Click **Import** to import the configuration file. The AP logs you out and reboots.

Restoring the AP to Factory Default Settings

To display the restore factory default option, navigate to **Tools** > **Configuration**. The Configuration tools display in the right pane.



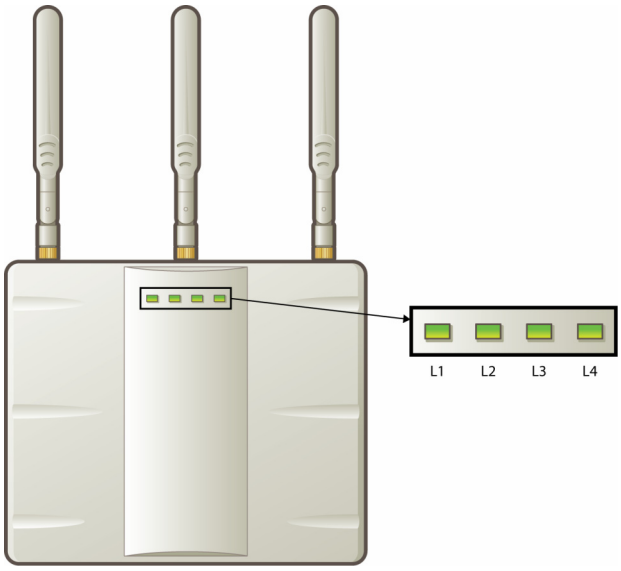
To restore the AP to factory default settings:

1. Under Restore Factory Defaults, click **Restore**. A dialog instructs you that this action will cause the AP to reboot.
2. Click **OK**. The AP logs you out and reboots with default settings.

LED Behavior

The AP has four front-panel status LEDs, as displayed in Figure A-1.

Figure A-1 AP LEDs



LED Initialization Display

When power is first applied, the AP LEDs display the initialization status. When the AP is powered on and when it boots, you can follow its progress through the initialization process by observing the LED sequence as displayed in the following tables.

Table A-1 LED Patterns of a Successful Initialization using Ethernet Backhaul

LED 1	LED 2	LED 3	LED 4	State
Blink Green	Table A-4	Off	Off	Power-on self test
Blink Green	Table A-4	Blink Green	Off	Random delay
Blink Green	Table A-4	Off	Blink Green	802.1x authentication
Blink Green	Table A-4	Blink Green	Blink Green	DHCP

Table A-2 displays the LED patterns during initialization using WDS backhaul.

Table A-2 LED Patterns of a Successful Initialization using WDS Backhaul

LED 1	LED 2	LED 3	LED 4	State
Blink Amber	Table A-4	Off	Off	Power-on self test
Blink Amber	Table A-4	Blink Green	Off	Random delay
Blink Amber	Table A-4	Solid Green	Off	WDS scanning
Blink Amber	Table A-4	Off	Blink Green	802.1x authentication
Blink Amber	Table A-4	Blink Green	Blink Green	DHCP

Table A-3 displays the LED patterns if any errors are reported during initialization.

Table A-3 LED Patterns for Errors during Initialization

LED 1	LED 2	LED 3	LED 4	State
Blink Red	Table A-4	Solid Green	Off	Reset to factory defaults
Blink Red	Table A-4	Off	Blink Green	Failed 802.1x authentication
Blink Red	Table A-4	Blink Green	Blink Green	Failed DHCP, using Default IP address
Blink Red	Table A-4	Blink Green	Solid Green	Failed image upgrade

Table A-4 LED 2 During Normal Operation

LED 2	State
Off	No Ethernet Connection
Solid Orange	10 Mb Ethernet Connection
Solid Green	100 Mb Ethernet Connection
Solid Blue	1 Gb Ethernet Connection

Normal Mode LED Behavior

This section displays the LED patterns for the AP when **LED Mode** is set to **Normal**. For more information about setting the LED mode, see"Configuring General LAN Settings" on page 4-2.

Table A-5 Normal Mode LED Patterns

LED 1	LED 2	LED 3	LED 4	State
Solid Green	Table A-4			Normal Operation using Ethernet Backhaul
Solid Amber	Table A-4			Normal Operation using WDS Backhaul
Off	Off	Off	Off	No power
Blink Green	Blink Green	Blink Green	Blink Green	LEDs in Identify Mode

Identify Mode LED Behavior

This section displays the LED patterns for the AP when **LED Mode** is set to **Identify**. For more information about setting the LED mode, see"Configuring General LAN Settings" on page 4-2.

Table A-6 Identify Mode LED Patterns

LED 1	LED 2	LED 3	LED 4	State
Blink Green	Blink Green	Blink Green	Blink Green	LEDs in Identify Mode

WDS Signal Strength Mode LED Behavior

This section displays the LED patterns for the AP when **LED Mode** is set to **WDS Signal Strength**. For more information about setting the LED mode, see"Configuring General LAN Settings" on page 4-2.

Table A-7 WDS Signal Strength Mode LED Patterns

LED 1	LED 2	LED 3	LED 4
Off	Off	Off	Blink Green
Off	Off	Blink Green	Solid Green
Off	Blink Green	Solid Green	Solid Green
Blink Green	Solid Green	Solid Green	Solid Green
Solid Green	Solid Green	Solid Green	Solid Green

B

SNMP Traps and MIBs

This chapter provides the SNMP traps and MIBs supported by the AP.

For information about...	Refer to page...
SNMP Traps	B-1
SNMP MIBs	B-2

SNMP Traps

Table B-1 SNMP Traps

Generic Trap #	Name	Description
0	Cold Start	The AP performs a power on.
1	Warm Start	The AP has re-initialized.
2	Link Down	When the radio is admin enabled but turned off due to radar detection.
3	Link Up	When eth0 comes up or radio comes up after radar event
4	Authentication Failure	Someone tries to do SNMP query with an invalid credential.
6	Enterprise Specific	Used to generate traps for all critical NV-LOG

Table B-2 Alarm Traps

Field	Range	Description
snmpTrapOID	OID	OID of hiPathWirelessLogAlarm 1.3.6.1.4.1.4329.15.3.9.6
logEventSeverity	Critical	AP only sends critical logs in this release
logEventComponent	Not supported	Hardcoded to “Access Point”
logEventDescription	Octet String	log description

SNMP MIBs

MIB-II (RFC1213)

Field	Range	Description
sysDescr	Read-only printable char	Contact/description field
sysObjectID	Read-only OID	The vendor's authorative identification of the network management subsystem contained in the entity. This gives a value of "1.3.6.1.4.1.4329.15.1.2.9" for AP3630 and "1.3.6.1.4.1.4329.15.1.2.10" for AP3640.
sysUpTime	Read-only TimeTics	The AP uptime (in hundredths of a second)
sysContact	Read-only printable char	Contact/description field
sysName	Read-only	AP name
sysLocation	Not supported	
sysServices	Bit Mask	Hard coded string "Wireless Access Point"

Policy MIB

Field	Range	Description
etsysPolicyProfileMaxEntries	Read-only Integer	Max number of policy profiles supported
etsysPolicyProfileNumEntries	Read-only Integer	Current number of entries in the etsysPolicyProfileTable
etsysPolicyProfileLastChange	TimeTics	sysUpTime which etsysPolicyProfileTable was last modified
etsysPolicyProfileTableNextAvailableIndex	Read-only Integer	Next empty slot in the table
etsysPolicyProfileName	Read-write 0-255 printable char	policy name
etsysPolicyProfileRowStatus	SNMP row status	User can only set to the following SNMP status: • active • CreateAndGo • CreateAndWait • destroy **Note:** For simplicity, the AP doesn't support notInService, which means the row exists but wlanService cannot refer to it.
etsysPolicyProfilePortVidStatus	EnabledStatus	• Enable-vlan tag will apply • Disable - no vlan tag

Field	Range	Description
etsysPolicyProfilePortVid	(0|1..4094|4095)	• 0 - no tagging. • 1-4094 - tagged with specified vlanId • 4095 - no tagging
etsysPolicyProfileRulePrecedence	Octet String	Hardcode to hex "\x01\x02\x03\x04\x05\x06\x07\x08\x0c\x0d\x0e\x0f\x10\x11\x12\x13\x15\x16\x19\x1a\x1b\x1c\x1f"
etsysPolicyProfileIndex	integer	The profile index number

C

Regulatory Information

Warning: Warnings identify essential information. Ignoring a warning can lead to problems with the application.

This appendix provides regulatory information for the HiPath Wireless AP3630 and AP3640 models.

Notes: Throughout this appendix, the term ‘Wireless AP’ refers to the AP models AP3630 and AP3640. Specific AP models are only identified in this appendix where it is necessary to do so.

Warning: Changes or modifications made to the Wireless APs which are not expressly approved by Enterasys could void the user's authority to operate the equipment.

Only authorized Enterasys service personnel are permitted to service the system. Procedures that should be performed only by Enterasys personnel are clearly identified in this guide.

Note: The Wireless APs are in compliance with the European Directive 2002/95/EC on the restriction of the use of certain hazardous substances (RoHS) in electrical and electronic equipment.

Wireless APs 3630 and 3640

This device is suitable for use in environmental air space in accordance with Section 300.22.C of the National Electrical Code, and Sections 2-128, 12-010(3) and 12-100 of the Canadian Electrical Code, Part 1, C22.1.

AP3640 External Antenna AP

Approved external antennas

The AP3640 external antenna APs can also be used with optional certified external antennas. Any unused antenna ports must be terminated when an external antenna is used with the AP3640.

For a list of approved external antennas, see “AP3640 Approved External Antennas” on page C-12.

United States

FCC Declaration of Conformity Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.

- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential and business environment. This equipment generates, uses, and radiates radio frequency energy, and if not installed and used in accordance with instructions, may cause harmful interference. However, there is no guarantee that interference will not occur. If this equipment does cause harmful interference, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the transmitting antenna.
- Increase the separation between the equipment or devices.
- Connect the equipment to an outlet other than the receiver's.
- Consult a dealer or an experienced radio/TV technician for suggestions.

USA Conformance Standards

This equipment meets the following conformance standards:

Safety

- UL 60950-1
- UL 2043 Plenum Rated as part of UL 60950-1. Suitable for use in environmental air space in accordance with Section 300.22.C of the National Electrical Code.

EMC

- FCC CFR 47 Part 15, Class B

Radio transceiver

- CFR 47 Part 15.247, Subpart C (2.4 GHz)
- CFR 47 Part 15.407, Subpart E (5 GHz)

Other

- IEEE 802.11a (5 GHz)
- IEEE 802.11b/g (2.4 GHz)
- IEEE 802.11n (AP3630, AP3640)
- IEEE 802.3af (PoE)

Warning: The Wireless APs must be installed and used in strict accordance with the manufacturer's instructions as described in this guide and related documentation for the device to which the Wireless AP is connected. Any other installation or use of the product violates FCC Part 15 regulations.

Operation of the Wireless AP is restricted for indoor use only, specifically in the UNII 5.15 - 5.25 GHz band in accordance with 47 CFR 15.407(e).

This Part 15 radio device operates on a non-interference basis with other devices operating at the same frequency when using the antennas provided or other Enterasys-certified antennas. Any changes or modifications to the product not expressly approved by Enterasys could void the user's authority to operate this device.

For the product available in the USA market, only channels 1 to 11 can be operated. Selection of other channels in the 2.4 GHz band is not possible.

FCC RF Radiation Exposure Statement

The Wireless AP complies with FCC RF radiated exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This device has been tested and has demonstrated compliance when simultaneously operated in the 2.4 GHz and 5 GHz frequency ranges. This device must not be co-located or operated in conjunction with any other antenna or transmitter.

The radiated output power of the Wireless AP is below the FCC radio frequency exposure limits as specified in "Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields" (OET Bulletin 65, Supplement C). This equipment should be installed and operated with a minimum distance of 25 cm between the radiator and your body or other co-located operating antennas.

External Antennas

The AP3640 external antenna AP can also be used with certified external antennas. However, in order to comply with the local laws and regulations, an approval may be required by the local regulatory authorities.

For a list of approved external antennas, see "AP3640 Approved External Antennas" on page C-12.

RF safety distance

The antennas used for this transmitter must be installed to provide a separation distance of at least 25 cm from all persons and must not be co-located or operating in conjunction with another antenna or transmitter.

Canada

Industry Canada Compliance Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled “Digital Apparatus,” ICES-003 of Industry Canada.

Cet appareil numerique respecte les limites de bruits radioelectriques applicables aux appareils numeriques de Classe B prescrites dans la norme sur le materiel brouilleur: “Appareils Numeriques,” NMB-003 edictee par le Industrie Canada.

This device complies with Part 15 of the FCC Rules and Canadian Standard RSS-210. Operation is subject to the following conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.
- This Class B digital apparatus complies with Canadian ICES-003.
- Operation in the 5150-5250 MHz band is only for indoor usage to reduce potential for harmful interference to co-channel mobile satellite systems.
- Please note that high power radars are allocated as primary users (meaning they have priority) and can cause interference in the 5250-5350 MHz and 5470-5725 MHz bands of LE-LAN devices.
- For the product available in the Canadian market, only channels 1 to 11 can be operated. Selection of other channels in the 2.4 GHz band is not possible.

Canada Conformance Standards

This equipment meets the following conformance standards:

Safety

- C22.2 No.60950-1-03
- UL 2043 Plenum Rated as part of UL 60950-1. Suitable for use in environmental air space in accordance with Sections 2-128, 12-010(3) and 12-100 of the Canadian Electrical Code, Part 1, C22.1

EMC

- ICES-003, Class B

Radio transceiver

- RSS-210 (2.4 GHz and 5GHz)

Other

- IEEE 802.11a (5 GHz)
- IEEE 802.11b/g (2.4 GHz)
- IEEE 802.11n (AP3630, AP3640)
- IEEE 802.3af (PoE)

External Antennas

The AP3640 external antenna AP can also be used with certified external antennas. However, in order to comply with the local laws and regulations, an approval may be required by the local regulatory authorities.

For a list of approved external antennas, see "AP3640 Approved External Antennas" on page C-12.

RF Safety Distance

The antennas used for this transmitter must be installed to provide a separation distance of at least 25 cm from all persons and must not be co-located or operating in conjunction with another antenna or transmitter.

European Community

The Wireless APs are designed for use in the European Union and other countries with similar regulatory restrictions where the end user or installer is allowed to configure the Wireless AP for operation by entry of a country code relative to a specific country. After the country code is selected, the Wireless AP will use the proper frequencies and power outputs for that country code.

Although outdoor use may be allowed and may be restricted to certain frequencies and/or may require a license for operation, the Wireless AP is intended for indoor use and must be installed in a proper indoor location. Contact local Authority for procedure to follow and regulatory information. For more details on legal combinations of frequencies, power levels and antennas, contact Enterasys.

Declaration of Conformity with R&TTE Directive of the European Union 1999/5/EC

The following symbol indicates compliance with the Essential Requirements of the R&TTE Directive of the European Union (1999/5/EC).

Declaration of Conformity in Languages of the European Community

English	Hereby, Enterasys, declares that this Radio LAN device is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
Finnish	Valmistaja Enterasys vakuuttaa täten että Radio LAN device tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
Dutch	Hierbij verklaart Enterasys dat het toestel Radio LAN device in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG. Bij deze verklaart Enterasys dat deze Radio LAN device voldoet aan de essentiële eisen en aan de overige relevante bepalingen van Richtlijn 1999/5/EC.
French	Par la présente Enterasys déclare que l'appareil Radio LAN device est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE. Par la présente, Enterasys déclare que ce Radio LAN device est conforme aux exigences essentielles et aux autres dispositions de la directive 1999/5/CE qui lui sont applicables.
Swedish	Härmed intygar Enterasys att denna Radio LAN device står I överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.
Danish	Undertegnede Enterasys erklærer herved, at følgende udstyr Radio LAN device overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.
German	Hiermit erklärt Enterasys die Übereinstimmung des "WLAN Wireless Controller bzw. Access Points" mit den grundlegenden Anforderungen und den anderen relevanten Festlegungen der Richtlinie 1999/5/EG.
Greek	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ Enterasys ΔΗΛΩΝΕΙ ΟΤΙ Radio LAN device ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.
Icelandic	Enterasys lysir her med yfir að thessi bunadur, Radio LAN device, uppfyllir allar grunnkrofur, sem gerdar eru i R&TTE tilskipun ESB nr 1999/5/EC.
Italian	Con la presente Enterasys dichiara che questo Radio LAN device è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.
Spanish	Por medio de la presente Enterasys declara que el Radio LAN device cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.
Portuguese	Enterasys declara que este Radio LAN device está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.
Malti	Hawnhekk, Enterasys, jiddikjara li dan Radio LAN device jikkonforma mal-htigijiet essenzjali u ma provvedimenti ohrajn relevanti li hemm fid-Dirrettiva 1999/5/EC.

New Member States requirements of Declaration of Conformity

Estonian	Käesolevaga kinnitab Enterasys seadme Radio LAN device vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
Hungary	Alulírott, Enterasys nyilatkozom, hogy a Radio LAN device megfelel a vonatkozó alapvetõ követelményeknek és az 1999/5/EC irányelv egyéb elõírásainak.
Slovak	Enterasys týmto vyhlasuje, že Radio LAN device spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.
Czech	Enterasys tímto prohlašuje, že tento Radio LAN device je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 1999/5/ES."
Slovenian	Šiuo Enterasys deklaruoja, kad šis Radio LAN device atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.
Latvian	Ar šo Enterasys deklarē, ka Radio LAN device atbilst Direktīvas 1999/5/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem
Lithuanian	Enterasys deklaruoja, kad Radio LAN device atitinka 1999/5/EC Direktyvos esminius reikalavimus ir kitas nuostatas".
Polish	Niniejszym, Enterasys, deklaruję, że Radio LAN device spełnia wymagania zasadnicze oraz stosowne postanowienia zawarte Dyrektywie 1999/5/EC.

European Conformance Standards

This equipment meets the following conformance standards:

Safety

- 2006/95/EC Low Voltage Directive (LVD)
- IEC/EN 60950-1 + National Deviations

EMC (Emissions / Immunity)

- 2004/108/EC EMC Directive
- EN 55011/CISPR 11, Class B, Group 1 ISM
- EN 55022/CISPR 22, Class B
- EN 55024/CISPR 24, includes IEC/EN 61000-4-2,3,4,5,6,11
- EN 61000-3-2 and -3-3 (Harmonics and Flicker)
- EN 60601-1-2 (EMC immunity for medical equipment)
- EN 50385 (EMF)
- ETSI/EN 301 489-1 & -17

Radio transceiver

- R&TTE Directive 1999/5/EC
- ETSI/EN 300 328 (2.4 GHz)
- ETSI/EN 301 893 (5 GHz)

Other

- IEEE 802.11a (5 GHz)
- IEEE 802.11b/g (2.4 GHz)
- IEEE 802.11n (AP3630, AP3640)
- IEEE 802.3af (PoE)

RoHS

- European Directive 2002/95/EC

External Antennas

The AP3640 external antenna AP can also be used with certified external antennas. However, in order to comply with the local laws and regulations, an approval may be required by the local regulatory authorities.

For a list of approved external antennas, see AP3640 Approved External Antennas.

RF safety distance

The antennas used for this transmitter must be installed to provide a separation distance of at least 25 cm from all persons and must not be co-located or operating in conjunction with another antenna or transmitter.

Conditions of use in the European Community

The Wireless APs with internal and external antennas are designed and intended to be used indoors. Some EU countries allow outdoor operation with limitations and restrictions, which are described in this section. It is the responsibility of the end user to ensure operation in accordance with these rules, frequencies, and transmitter power output. The Wireless AP must not be operated until properly configured for the customer's geographic location.

Caution: The user or installer is responsible to ensure that the Wireless AP is operated according to channel limitations, indoor / outdoor restrictions, license requirements, and within power level limits for the current country of operation. A configuration utility has been provided with the Wireless AP to allow the end user to check the configuration and make necessary configuration changes to ensure proper operation in accordance with the spectrum usage rules for compliance with the European R&TTE directive 1999/5/EC.

Caution: Please follow the instructions in this user guide to properly configure the Wireless AP.

- Each Wireless AP is configured with a default group of settings. There is the ability to change these settings. The user or installer is responsible to ensure that each Wireless AP is properly configured.
- The software within the Wireless AP will automatically limit the allowable channels and output power determined by the selected country code. Selecting the incorrect country of operation or misidentifying the antenna being used,may result in illegal operation and may cause harmful interference to other systems.
- This device employs a radar detection feature required for European Community operation in the 5 GHz band. This feature is automatically enabled when the country of operation is correctly configured for any European Community country. The presence of nearby radar operation may result in temporary interruption of operation of this device. The radar detection feature will automatically restart operation on a channel free of radar.
- The 5 GHz Turbo Mode feature is not enabled for use on the Wireless APs.
- The 5150- 5350 MHz band, channels 36, 40, 44, 48, 52, 56, 60, or 64, are restricted to indoor use only.
- The external antenna APs must only use antennas that are certified by Enterasys.
- The 2.4 GHz band, channels 1 - 13, may be used for indoor or outdoor use but there may be some channel restrictions.
- In Greece and Italy, the end user must apply for a license from the national spectrum authority to operate outdoors.
- In France, outdoor operation is not permitted using the 2.4 - 2.454 GHz band.

European Spectrum Usage Rules

The AP configured with approved internal or external antennas can be used for indoor and outdoor transmissions throughout the European community as displayed in Table C-1. Some restrictions apply in Belgium, France, Greece, and Italy.

Table C-1 European spectrum usage rules

Country	5.15-5.25 (GHz) Channels: 36,40,44,48	5.25-5.35 (GHz) Channels: 52,56,60,64	5.47-5.725 (GHz) Channels: 100,104,108,112,116, 132,136,140	2.4-2.4835 (GHz) Channels: 1 to 13 (Except Where Noted)
Austria	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Belgium	Indoor only	Indoor only	Indoor or outdoor *	Indoor or outdoor
Bulgaria	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Croatia	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Cyprus	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Czech Rep.	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Denmark	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Estonia	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Finland	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
France	Indoor only	Indoor only	Indoor or outdoor	Indoor only
Germany	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Greece	Indoor only	Indoor only	Indoor (Outdoor w/License)	Indoor (Outdoor w/license)

Table C-1 European spectrum usage rules

Country	5.15-5.25 (GHz) Channels: 36,40,44,48	5.25-5.35 (GHz) Channels: 52,56,60,64	5.47-5.725 (GHz) Channels: 100,104,108,112,116, 132,136,140	2.4-2.4835 (GHz) Channels: 1 to 13 (Except Where Noted)
Hungary	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Iceland	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Ireland	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Italy	Indoor only	Indoor only	Indoor or outdoor	Indoor (Outdoor w/license)
Latvia	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Liechtenstein	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Lithuania	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Luxembourg	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Malta	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Netherlands	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Norway	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Poland	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Portugal	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Romania	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Slovak Rep.	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Slovenia	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Spain	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Sweden	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Switzerland	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
Turkey	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor
U.K	Indoor only	Indoor only	Indoor or outdoor	Indoor or outdoor

Note: * Belgium requires notifying the spectrum agency if deploying > 300 meter wireless links in outdoor public areas.

Certifications of Other Countries

The Wireless APs have been certified for use in various other countries. Once the correct country code is selected, the Wireless AP automatically uses the proper frequencies and power outputs for that country code.

It is the responsibility of the end user to select the proper country code for the country the device will be operated within or run the risk violating local laws and regulations.

Approved external antennas

The external antenna Wireless APs can also be used with certified external antennas. However, in order to comply with the local laws and regulations, an approval may be required by the local regulatory authorities.

For a list of approved external antennas, see AP3640 Approved External Antennas.

Other country specific compliance standards, approvals and declarations

- IEC 60950-1 CB Scheme + National Deviations
- AS/NZS 60950.1 (Safety)
- AS/NZS 3548 (Emissions via EU standards – ACMA)
- AS/NZS 4288 (Radio via EU standards)
- EN 300 328 (2.4 GHz)
- EN 301 893 (5 GHz)
- EN 301 489-1 & -17 (RLAN)
- IEEE 802.11a (5 GHz)
- IEEE 802.11b/g (2.4 GHz)
- IEEE 802.11n (AP3630, AP3640)
- IEEE 802.3af (PoE)

AP3640 Approved External Antennas

The AP3640 external antenna APs can be used with certified external antennas. However, in order to comply with the local laws and regulations, an approval may be required by the local regulatory authorities. The following optional antennas have been tested and approved for use with the external antenna models.

Table C-2 List of approved antennas — AP3640

Model	Application	Shape	Gain (dBi)	Frequency (MHz)	Connector Type
WS-ANT02	indoor	omni	4	2400-2500 5150-5900	Reverse Polarity SMA Plug
WS-AO-DS05360	outdoor	omni	5	2400-2500 5150-5350	Reverse Polarity Type-N Jack
WS-AO-D16060	outdoor	60 degree sector directional, 2 inputs	16	5150-5875	Reverse Polarity Type-N Jack
WS-AO-5D23009	outdoor	panel, 2 inputs	23	5150-5875	Reverse Polarity Type-N Jack
WS-AI-DT04360	indoor	omni, 3 inputs	3 4	2400-2500 4900-5990	Reverse Polarity SMA Plugs, 3ea.
WS-AI-DT05120	indoor	120 degree sector directional, 3 inputs	5	2300-2700 4900-6100	Reverse Polarity SMA Plugs

RF safety distance

The antennas used for this transmitter must be installed to provide a separation distance of at least 25 cm from all persons and must not be co-located or operating in conjunction with another antenna or transmitter.

D

Glossary

Term	Definition
AAA	Authentication, Authorization and Accounting. A system in IP-based networking to control what computer resources users have access to and to keep track of the activity of users over a network.
Access Point (AP)	A wireless LAN transceiver or ‘base station’ that can connect a wired LAN to one or many wireless devices.
ACS	Automatic Channel Selection.
ADDBA	Add Block Acknowledgement.
Ad-hoc mode	An 802.11 networking framework in which devices or stations communicate directly with each other, without the use of an access point (AP). (Compare Infrastructure Mode)
AES	Advanced Encryption Standard (AES) is an algorithm for encryption that works at multiple network layers simultaneously. As a block cipher, AES encrypts data in fixed-size blocks of 128 bits. AES was created by the National Institute of Standards and Technology (NIST). AES is a privacy transform for IPSec and Internet Key Exchange (IKE). AES has a variable key length - the algorithm can specify a 128-bit key (the default), a 192-bit key, or a 256-bit key. For the WPA2/802.11i implementation of AES, a 128 bit key length is used. AES encryption includes 4 stages that make up one round. Each round is then iterated 10, 12 or 14 times depending upon the bit-key size. For the WPA2/802.11i implementation of AES, each round is iterated 10 times.
AES-CCMP	AES uses the Counter-Mode/CBC-MAC Protocol (CCMP). CCM is a new mode of operation for a block cipher that enables a single key to be used for both encryption and authentication. The two underlying modes employed in CCM include Counter mode (CTR) that achieves data encryption and Cipher Block Chaining Message Authentication Code (CBC-MAC) to provide data integrity.
ARP	Address Resolution Protocol. A protocol used to obtain the physical addresses (such as MAC addresses) of hardware units in a network environment. A host obtains such a physical address by broadcasting an ARP request, which contains the IP address of the target hardware unit. If the request finds a unit with that IP address, the unit replies with its physical hardware address.
Association	A connection between a wireless device and an Access Point.

Term	Definition
asynchronous	Asynchronous transmission mode (ATM). A start/stop transmission in which each character is preceded by a start signal and followed by one or more stop signals. A variable time interval can exist between characters. ATM is the preferred technology for the transfer of images.
BSS	Basic Service Set. A wireless topology consisting of one Access Point connected to a wired network and a set of wireless devices. Also called an infrastructure network. *See also* IBSS.
Captive Portal	A browser-based authentication mechanism that forces unauthenticated users to a Web page. Sometimes called a 'reverse firewall'.
CDR	Call Data (Detail) Record In Internet telephony, a call detail record is a data record that contains information related to a telephone call, such as the origination and destination addresses of the call, the time the call started and ended, the duration of the call, the time of day the call was made and any toll charges that were added through the network or charges for operator services, among other details of the call. In essence, call accounting is a database application that processes call data from your switch (PBX, iPBX, or key system) via a CDR (call detail record) or SMDR (station message detail record) port. The call data record details your system's incoming and outgoing calls by thresholds, including time of call, duration of call, dialing extension, and number dialed. Call data is stored in a PC database
CHAP	Challenge-Handshake Authentication Protocol. One of the two main authentication protocols used to verify a user's name and password for PPP Internet connections. CHAP is more secure than PAP because it performs a three-way handshake during the initial link establishment between the home and remote machines. It can also repeat the authentication anytime after the link has been established.
CLI	Command Line Interface.
Collision	Two Ethernet packets attempting to use the medium simultaneously. Ethernet is a shared media, so there are rules for sending packets of data to avoid conflicts and protect data integrity. When two nodes at different locations attempt to send data at the same time, a collision will result. Segmenting the network with bridges or switches is one way of reducing collisions in an overcrowded network.
Datagram	A datagram is "a self-contained, independent entity of data carrying sufficient information to be routed from the source to the destination computer without reliance on earlier exchanges between this source and destination computer and the transporting network." (RFC1594). The term has been generally replaced by the term packet. Datagrams or packets are the message units that the Internet Protocol deals with and that the Internet transports.
dBm	An abbreviation for the power ratio in decibels (dB) of the measured power referenced to one milliwatt.
Decapsulation	*See* tunnelling.

Term	Definition
Device Server	A specialized, network-based hardware device designed to perform a single or specialized set of server functions. Print servers, terminal servers, remote access servers and network time servers are examples of device servers.
DHCP	Dynamic Host Configuration Protocol. A protocol for assigning dynamic IP addresses to devices on a network. With dynamic addressing, a device can have a different IP address every time it connects to the network. In some systems, the device's IP address can even change while it is still connected. DHCP also supports a mix of static and dynamic IP addresses. DHCP consists of two components: a protocol for delivering host-specific configuration parameters from a DHCP server to a host and a mechanism for allocation of network addresses to hosts. (IETF RFC1531.) Option 78 specifies the location of one or more SLP Directory Agents. Option 79 specifies the list of scopes that a SLP Agent is configured to use.(RFC2610 - DHCP Options for Service Location Protocol)
Directory Agent (DA)	A method of organizing and locating the resources (such as printers, disk drives, databases, e-mail directories, and schedulers) in a network. Using SLP, networking applications can discover the existence, location and configuration of networked devices. With Service Location Protocol, client applications are 'User Agents' and services are advertised by 'Service Agents'. The User Agent issues a multicast 'Service Request' (SrvRqst) on behalf of the client application, specifying the services required. The User Agent will receive a Service Reply (SrvRply) specifying the location of all services in the network which satisfy the request. For larger networks, a third entity, called a 'Directory Agent', receives registrations from all available Service Agents. A User Agent sends a unicast request for services to a Directory Agent (if there is one) rather than to a Service Agent. (SLP version 2, RFC2608, updating RFC2165)
Diversity antenna and receiver	The AP has two antennae. Receive diversity refers to the ability of the AP to provide better service to a device by receiving from the user on which ever of the two antennae is receiving the cleanest signal. Transmit diversity refers to the ability of the AP to use its two antenna to transmit on a specific antenna only, or on a alternate antennae. The antennae are called diversity antennae because of this capability of the pair.
DNS	Domain Name Server
DSSS	Direct-Sequence Spread Spectrum. A transmission technology used in Local Area Wireless Network (LAWN) transmissions where a data signal at the sending station is combined with a higher data rate bit sequence, or chipping code, that divides the user data according to a spreading ratio. The chipping code is a redundant bit pattern for each bit that is transmitted, which increases the signal's resistance to interference. If one or more bits in the pattern are damaged during transmission, the original data can be recovered due to the redundancy of the transmission. (Compare FHSS)
DTIM	DTIM delivery traffic indication message (in 802.11 standard)

Term	Definition
Dynamic WEP	The IEEE introduced the concept of user-based authentication using per-user encryption keys to solve the scalability issues that surrounded static WEP. This resulted in the 802.1X standard, which makes use of the IETF's Extensible Authentication Protocol (EAP), which was originally designed for user authentication in dial-up networks. The 802.1X standard supplemented the EAP protocol with a mechanism to send an encryption key to a Wireless AP. These encryption keys are used as dynamic WEP keys, allowing traffic to each individual user to be encrypted using a separate key.
EAP-TLS EAP-TTLS	EAP-TLS Extensible Authentication Protocol - Transport Layer Security. A general protocol for authentication that also supports multiple authentication methods, such as token cards, Kerberos, one-time passwords, certificates, public key authentication and smart cards. IEEE 802.1x specifies how EAP should be encapsulated in LAN frames. In wireless communications using EAP, a user requests connection to a WLAN through an access point, which then requests the identity of the user and transmits that identity to an authentication server such as RADIUS. The server asks the access point for proof of identity, which the access point gets from the user and then sends back to the server to complete the authentication. EAP-TLS provides for certificate-based and mutual authentication of the client and the network. It relies on client-side and server-side certificates to perform authentication and can be used to dynamically generate user-based and session-based WEP keys. EAP-TTLS (Tunneled Transport Layer Security) is an extension of EAP-TLS to provide certificate-based, mutual authentication of the client and network through an encrypted tunnel, as well as to generate dynamic, per-user, per-session WEP keys. Unlike EAP-TLS, EAP-TTLS requires only server-side certificates. (*See also* PEAP)
ELA (OPSEC)	Event Logging API (Application Program Interface) for OPSEC, a module in Check Point used to enable third-party applications to log events into the Check Point VPN-1/FireWall-1 management system.
Encapsulation	*See* tunnelling.
ESS	Extended Service Set (ESS). Several Basic Service Sets (BSSs) can be joined together to form one logical WLAN segment, referred to as an extended service set (ESS). The SSID is used to identify the ESS. (*See* BSS and SSID.)
FHSS	Frequency-Hopping Spread Spectrum. A transmission technology used in Local Area Wireless Network (LAWN) transmissions where the data signal is modulated with a narrowband carrier signal that ‘hops’ in a random but predictable sequence from frequency to frequency as a function of time over a wide band of frequencies. This technique reduces interference. If synchronized properly, a single logical channel is maintained. (Compare DSSS)

Term	Definition
Fit, thin and fat APs	A thin AP architecture uses two components: an access point that is essentially a stripped-down radio and a centralized management controller that handles the other WLAN system functions. Wired network switches are also required. A fit AP, a variation of the thin AP, handles the RF and encryption, while the central management controller, aware of the wireless users' identities and locations, handles secure roaming, quality of service, and user authentication. The central management controller also handles AP configuration and management. A fat (or thick) AP architecture concentrates all the WLAN intelligence in the access point. The AP handles the radio frequency (RF) communication, as well as authenticating users, encrypting communications, secure roaming, WLAN management, and in some cases, network routing.
FQDN	Fully Qualified Domain Name. A ‘friendly’ designation of a computer, of the general form computer.[subnetwork.].organization.domain. The FQDN names must be translated into an IP address in order for the resource to be found on a network, usually performed by a Domain Name Server.
FTM	Forwarding Table Manager
FTP	File Transfer Protocol
Gateway	In the wireless world, an access point with additional software capabilities such as providing NAT and DHCP. Gateways may also provide VPN support, roaming, firewalls, various levels of security, etc.
Gigabit Ethernet	The high data rate of the Ethernet standard, supporting data rates of 1 gigabit (1,000 megabits) per second.
GUI	Graphical User Interface
Heartbeat message	A heartbeat message is a UDP data packet used to monitor a data connection, polling to see if the connection is still alive. In general terms, a heartbeat is a signal emitted at regular intervals by software to demonstrate that it is still alive. In networking, a heartbeat is the signal emitted by a Level 2 Ethernet transceiver at the end of every packet to show that the collision-detection circuit is still connected.
Host	(1) A computer (usually containing data) that is accessed by a user working on a remote terminal, connected by modems and telephone lines. (2) A computer that is connected to a TCP/IP network, including the Internet. Each host has a unique IP address.
HTTP	Hypertext Transfer Protocol is the set of rules for transferring files (text, graphic images, sound, video, and other multimedia files) on the World Wide Web. A Web browser makes use of HTTP. HTTP is an application protocol that runs on top of the TCP/IP suite of protocols. (RFC2616: Hypertext Transfer Protocol -- HTTP/1.1)

Term	Definition
HTTPS	Hypertext Transfer Protocol over Secure Socket Layer, or HTTP over SSL, is a Web protocol that encrypts and decrypts user page requests as well as the pages that are returned by the Web server. HTTPS uses Secure Socket Layer (SSL) as a sublayer under its regular HTTP application layering. (HTTPS uses port 443 instead of HTTP port 80 in its interactions with the lower layer, TCP/IP.) SSL uses a 40-bit key size for the RC4 stream encryption algorithm, which is considered an adequate degree of encryption for commercial exchange.
IBSS	Independent Basic Service Set. *See* BSS. An IBSS is the 802.11 term for an adhoc network. *See* adhoc network.
ICMP	Internet Control Message Protocol, an extension to the Internet Protocol (IP) defined by RFC792. ICMP supports packets containing error, control, and informational messages. The PING command, for example, uses ICMP to test an Internet connection.
ICV	ICV (Integrity Check Value) is a 4-byte code appended in standard WEP to the 802.11 message. Enhanced WPA inserts an 8-byte MIC just before the ICV. (*See* WPA and MIC)
IE	Internet Explorer.
IEEE	Institute of Electrical and Electronics Engineers, a technical professional association, involved in standards activities.
IETF	Internet Engineering Task Force, the main standards organization for the Internet.
Infrastructure Mode	An 802.11 networking framework in which devices communicate with each other by first going through an Access Point (AP). In infrastructure mode, wireless devices can communicate with each other or can communicate with a wired network. (*See* ad-hoc mode and BSS.)
Internet or IP telephony	IP or Internet telephony are communications, such as voice, facsimile, voice-messaging applications, that are transported over the Internet, rather than the public switched telephone network (PSTN). IP telephony is the two-way transmission of audio over a packet-switched IP network (TCP/IP network). An Internet telephone call has two steps: (1) converting the analog voice signal to digital format, (2) translating the signal into Internet protocol (IP) packets for transmission over the Internet. At the receiving end, the steps are reversed. Over the public Internet, voice quality varies considerably. Protocols that support Quality of Service (QoS) are being implemented to improve this.
IP	Internet Protocol is the method or protocol by which data is sent from one computer to another on the Internet. Each computer (host) on the Internet has at least one IP address that uniquely identifies it. Internet Protocol specifies the format of packets, also called datagrams, and the addressing scheme. Most networks combine IP with a higher-level protocol called Transmission Control Protocol (TCP), which establishes a virtual connection between a destination and a source.
IPC	Interprocess Communication. A capability supported by some operating systems that allows one process to communicate with another process. The processes can be running on the same computer or on different computers connected through a network.

Term	Definition
IPsec IPsec-ESP IPsec-AH	Internet Protocol security (IPSec) Internet Protocol security Encapsulating Security Payload (IPsec-ESP). The encapsulating security payload (ESP) encapsulates its data, enabling it to protect data that follows in the datagram.Internet Protocol security Authentication Header (IPsec-AH). AH protects the parts of the IP datagram that can be predicted by the sender as it will be received by the receiver.IPsec is a set of protocols developed by the IETF to support secure exchange of packets at the IP layer. IPsec has been deployed widely to implement Virtual Private Networks (VPNs). IPsec supports two encryption modes: Transport and Tunnel. Transport mode encrypts only the data portion (payload) of each packet, but leaves the header untouched. The more secure Tunnel mode encrypts both the header and the payload. On the receiving side, an IPSec-compliant device decrypts each packet. For IPsec to work, the sending and receiving devices must share a public key. This is accomplished through a protocol known as Internet Security Association and Key Management Protocol/Oakley (ISAKMP/Oakley), which allows the receiver to obtain a public key and authenticate the sender using digital certificates.
isochronous	Isochronous data is data (such as voice or video) that requires a constant transmission rate, where data must be delivered within certain time constraints. For example, multimedia streams require an isochronous transport mechanism to ensure that data is delivered as fast as it is displayed and to ensure that the audio is synchronized with the video. Compare: asynchronous processes in which data streams can be broken by random intervals, and synchronous processes, in which data streams can be delivered only at specific intervals.
ISP	Internet Service Provider.
IV	IV (Initialization Vector), part of the standard WEP encryption mechanism that concatenates a shared secret key with a randomly generated 24-bit initialization vector. WPA with TKIP uses 48-bit IVs, an enhancement that significantly increases the difficulty in cracking the encryption. (*See* WPA and TKIP)
LAN	Local Area Network.
License installation	
LSA	Link State Advertisements received by the currently running OSPF process. The LSAs describe the local state of a router or network, including the state of the router's interfaces and adjacencies. *See* also OSPF.
MAC	Media Access Control layer. One of two sublayers that make up the Data Link Layer of the OSI model. The MAC layer is responsible for moving data packets to and from one Network Interface Card (NIC) to another across a shared channel.
MAC address	Media Access Control address. A hardware address that uniquely identifies each node of a network.

Term	Definition
MIB	Management Information Base is a formal description of a set of network objects that can be managed using the Simple Network Management Protocol (SNMP). The format of the MIB is defined as part of the SNMP. A MIB is a collection of definitions defining the properties of a managed object within a device. Every managed device keeps a database of values for each of the definitions written in the MIB. Definition of the MIB conforms to RFC1155 (Structure of Management Information).
MIC	Message Integrity Check or Code (MIC), also called 'Michael', is part of WPA and TKIP. The MIC is an additional 8-byte code inserted before the standard 4-byte integrity check value (ICV) that is appended in by standard WEP to the 802.11 message. This greatly increases the difficulty in carrying out forgery attacks. Both integrity check mechanisms are calculated by the receiver and compared against the values sent by the sender in the frame. If the values match, there is assurance that the message has not been tampered with. (*See* WPA, TKIP and ICV).
MTU	Maximum Transmission Unit. The largest packet size, measured in bytes, that a network interface is configured to accept. Any messages larger than the MTU are divided into smaller packets before being sent.
MU	Mobile Unit, a wireless device such as a PC laptop.
multicast, broadcast, unicast	Multicast: transmitting a single message to a select group of recipients. Broadcast: sending a message to everyone connected to a network. Unicast: communication over a network between a single sender and a single receiver.
NAS	Network Access Server, a server responsible for passing information to designated RADIUS servers and then acting on the response returned. A NAS-Identifier is a RADIUS attribute identifying the NAS server. (RFC2138)
NAT	Network Address Translator. A network capability that enables a group of computers to dynamically share a single incoming IP address. NAT takes the single incoming IP address and creates new IP address for each client computer on the network.
Netmask	In administering Internet sites, a netmask is a string of 0's and 1's that mask or screen out the network part of an IP address, so that only the host computer part of the address remains. A frequently-used netmask is 255.255.255.0, used for a Class C subnet (one with up to 255 host computers). The ".0" in the "255.255.255.0" netmask allows the specific host computer address to be visible.
NIC	Network Interface Card. An expansion board in a computer that connects the computer to a network.
NMS	Network Management System. The system responsible for managing a network or a portion of a network. The NMS talks to network management agents, which reside in the managed nodes.

Term	Definition
NTP	Network Time Protocol, an Internet standard protocol (built on top of TCP/IP) that assures accurate synchronization to the millisecond of computer clock times in a network of computers. Based on UTC, NTP synchronizes client workstation clocks to the U.S. Naval Observatory Master Clocks in Washington, DC and Colorado Springs CO. Running as a continuous background client program on a computer, NTP sends periodic time requests to servers, obtaining server time stamps and using them to adjust the client's clock. (RFC1305)
OFDM	Orthogonal frequency division multiplexing, a method of digital modulation in which a signal is split into several narrowband channels at different frequencies. OFDM is similar to conventional frequency division multiplexing (FDM). The difference lies in the way in which the signals are modulated and demodulated. Priority is given to minimizing the interference, or crosstalk, among the channels and symbols comprising the data stream. Less importance is placed on perfecting individual channels. OFDM is used in European digital audio broadcast services. It is also used in wireless local area networks.
OID	Object Identifier.
OPSEC	OPSEC (Open Platform for Security) is a security alliance program created by Check Point to enable an open industry-wide framework for interoperability of security products and applications. Products carrying the ‘Secured by Check Point’ seal have been tested to guarantee integration and interoperability.
OS	Operating system.
OSI	Open System Interconnection. An ISO standard for worldwide communications that defines a networking framework for implementing protocols in seven layers. Control is passed from one layer to the next, starting at the application layer in one station, down through the presentation, session, transport, network, data link layer to the physical layer at the bottom, over the channel to the next station and back up the hierarchy.
OSI Layer 2	At the Data Link layer (OSI Layer 2), data packets are encoded and decoded into bits. The data link layer has two sublayers: the Logical Link Control (LLC) layer controls frame synchronization, flow control and error checking The Media Access Control (MAC) layer controls how a computer on the network gains access to the data and permission to transmit it.
OSI Layer 3	The Network layer (OSI Layer 3) provides switching and routing technologies, creating logical paths, known as virtual circuits, for transmitting data from node to node. Routing and forwarding are functions of this layer, as well as addressing, internetworking, error handling, congestion control and packet sequencing.

Term	Definition
OSPF	Open Shortest Path First, an interior gateway routing protocol developed for IP networks based on the shortest path first or link-state algorithm. Routers use link-state algorithms to send routing information to all nodes in an internetwork by calculating the shortest path to each node based on a topography of the Internet constructed by each node. Each router sends that portion of the routing table (keeps track of routes to particular network destinations) that describes the state of its own links, and it also sends the complete routing structure (topography). Using OSPF, a host that obtains a change to a routing table or detects a change in the network immediately multicasts the information to all other hosts in the network so that all will have the same routing table information. The host using OSPF sends only the part that has changed, and only when a change has taken place. (RFC2328)
OUI	Organizationally Unique Identifier (used in MAC addressing).
Packet	The unit of data that is routed between an origin and a destination on the Internet or any other packet-switched network. When any file is sent from one place to another on the Internet, the Transmission Control Protocol (TCP) layer of TCP/IP divides the file into packets. Each packet is separately numbered and includes the Internet address of the destination. The individual packets for a given file may travel different routes through the Internet. When they have all arrived, they are reassembled into the original file (by the TCP layer at the receiving end).
PAP	Password Authentication Protocol is the most basic form of authentication, in which a user's name and password are transmitted over a network and compared to a table of name-password pairs. Typically, the passwords stored in the table are encrypted. (*See* CHAP).
PDU	Protocol Data Unit. A data object exchanged by protocol machines (such as management stations, SMUX peers, and SNMP agents) and consisting of both protocol control information and user data. PDU is sometimes used as a synonym for “packet".
PEAP	PEAP (Protected Extensible Authentication Protocol) is an IETF draft standard to authenticate wireless LAN clients without requiring them to have certificates. In PEAP authentication, first the user authenticates the authentication server, then the authentication server authenticates the user. If the first phase is successful, the user is then authenticated over the SSL tunnel created in phase one using EAP-Generic Token Card (EAP-GTC) or Microsoft Challenged Handshake Protocol Version 2 (MSCHAP V2). (*See* also EAP-TLS).
PHP server	Hypertext Preprocessor
PKI	Public Key Infrastructure
PoE	Power over Ethernet. The Power over Ethernet standard (802.3af) defines how power can be provided to network devices over existing Ethernet connection, eliminating the need for additional external power supplies.
POST	Power On Self Test, a diagnostic testing sequence performed by a computer to determine if its hardware elements are present and powered on. If so, the computer begins its boot sequence.

Term	Definition
push-to-talk (PTT)	The push-to-talk (PTT) is feature on wireless telephones that allows them to operate like a walkie-talkie in a group, instead of standard telephone operation. The PTT feature requires that the network be configured to allow multicast traffic. A PTT call is initiated by selecting a channel and pressing the 'talk' key on the wireless telephone. All wireless telephones on the same network that are monitoring the channel will hear the transmission. On a PTT call you hold the button to talk and release it to listen.
QoS	Quality of Service. A term for a number of techniques that intelligently match the needs of specific applications to the network resources available, using such technologies as Frame Relay, Asynchronous Transfer Mode (ATM), Ethernet and 802.1 networks, SONET, and IP-routed networks. QoS features provide better network service by supporting dedicated bandwidth, improving loss characteristics, avoiding and managing network congestion, shaping network traffic, setting traffic priorities across the network. Quality-of-Service (QoS): A set of service requirements to be met by the network while transporting a flow. (RFC2386)
RADIUS	Remote Authentication Dial-In User Service. An authentication and accounting system that checks User Name and Password and authorizes access to a network. The RADIUS specification is maintained by a working group of the IETF (RFC2865 RADIUS, RFC2866 RADIUS Accounting, RFC2868 RADIUS Attributes for Tunnel Protocol Support).
RF	Radio Frequency, a frequency in the electromagnetic spectrum associated with radio wave propagation. When an RF current is supplied to an antenna, an electromagnetic field is created that can propagate through space. These frequencies in the electromagnetic spectrum range from Ultra-low frequency (ULF) -- 0-3 Hz to Extremely high frequency (EHF) -- 30GHz - 300 GHz. The middle ranges are: Low frequency (LF) -- 30 kHz - 300 kHz, Medium frequency (MF) -- 300 kHz - 3 MHz, High frequency (HF) -- 3MHz - 30 MHz, Very high frequency (VHF) -- 30 MHz - 300 MHz, Ultra-high frequency (UHF)-- 300MHz - 3 GHz.
RFC	Request for Comments, a series of notes about the Internet, submitted to the Internet Engineering Task Force (IETF) and designated by an RFC number, that may evolve into an Internet standard. The RFCs are catalogued and maintained on the IETF RFC website: www.ietf.org/rfc.html.
Roaming	In 802.11, roaming occurs when a wireless device (a station) moves from one Access Point to another (or BSS to another) in the same Extended Service Set (ESS) -identified by its SSID.
RP-SMA	Reverse Polarity-Subminiature version A, a type of connector used with wireless antennas
RSN	Robust Security Network. A new standard within IEEE 802.11 to provide security and privacy mechanisms. The RSN (and related TSN) both specify IEEE 802.1x authentication with Extensible Authentication Protocol (EAP).
RSSI	RSSI received signal strength indication (in 802.11 standard)
RTS / CTS	RTS request to send, CTS clear to send (in 802.11 standard)

Term	Definition
Segment	In Ethernet networks, a section of a network that is bounded by bridges, routers or switches. Dividing a LAN segment into multiple smaller segments is one of the most common ways of increasing available bandwidth on the LAN.
SLP	Service Location Protocol. A method of organizing and locating the resources (such as printers, disk drives, databases, e-mail directories, and schedulers) in a network. Using SLP, networking applications can discover the existence, location and configuration of networked devices. With Service Location Protocol, client applications are 'User Agents' and services are advertised by 'Service Agents'. The User Agent issues a multicast 'Service Request' (SrvRqst) on behalf of the client application, specifying the services required. The User Agent will receive a Service Reply (SrvRply) specifying the location of all services in the network which satisfy the request. For larger networks, a third entity, called a 'Directory Agent', receives registrations from all available Service Agents. A User Agent sends a unicast request for services to a Directory Agent (if there is one) rather than to a Service Agent. (SLP version 2, RFC2608, updating RFC2165)
SMI	Structure of Management Information. A hierarchical tree structure for information that underlies Management Information Bases (MIBs), and is used by the SNMP protocol. Defined in RFC1155 and RFC1442 (SNMPv2).
SMT (802.11)	Station ManagemenT. The object class in the 802.11 MIB that provides the necessary support at the station to manage the processes in the station such that the station may work cooperatively as a part of an IEEE 802.11 network. The four branches of the 802.11 MIB are: dot11smt - objects related to station management and local configuration dot11mac - objects that report/configure on the status of various MAC parameters dot11res - Objects that describe available resources dot11phy - Objects that report on various physical items.
SNMP	Simple Network Management Protocol. A set of protocols for managing complex networks. SNMP works by sending messages, called protocol data units (PDUs), to different parts of a network. SNMP-compliant devices, called agents, store data about themselves in Management Information Bases (MIBs) and return this data to the SNMP requesters. SNMP includes a limited set of management commands and responses. The management system issues Get, GetNext and Set messages to retrieve single or multiple object variables or to establish the value of a single variable. The managed agent sends a Response message to complete the Get, GetNext or Set.
SNMP trap	An event notification sent by the SNMP managed agent to the management system to identify the occurrence of conditions (such as a threshold that exceeds a predetermined value).

Term	Definition
SSH	Secure Shell, sometimes known as Secure Socket Shell, is a Unix-based command interface and protocol for securely getting access to a remote computer. SSH is a suite of three utilities - slogin, ssh, and scp - secure versions of the earlier UNIX utilities, rlogin, rsh, and rcp. With SSH commands, both ends of the client/ server connection are authenticated using a digital certificate, and passwords are protected by being encrypted.
SSID	Service Set Identifier. A 32-character unique identifier attached to the header of packets sent over a Wireless LAN that acts as a password when a wireless device tries to connect to the Basic Service Set (BSS). Several BSSs can be joined together to form one logical WLAN segment, referred to as an extended service set (ESS). The SSID is used to identify the ESS. In 802.11 networks, each Access Point advertises its presence several times per second by broadcasting beacon frames that carry the ESS name (SSID). Stations discover APs by listening for beacons, or by sending probe frames to search for an AP with a desired SSID. When the station locates an appropriately-named Access Point, it sends an associate request frame containing the desired SSID. The AP replies with an associate response frame, also containing the SSID. Some APs can be configured to send a zero-length broadcast SSID in beacon frames instead of sending their actual SSID. The AP must return its actual SSID in the probe response.
SSL	Secure Sockets Layer. A protocol developed by Netscape for transmitting private documents via the Internet. SSL works by using a public key to encrypt data that's transferred over the SSL connection. URLs that require an SSL connection start with https: instead of http. SSL uses a program layer located between the Internet's Hypertext Transfer Protocol (HTTP) and Transport Control Protocol (TCP) layers. The ‘sockets’ part of the term refers to the sockets method of passing data back and forth between a client and a server program in a network or between program layers in the same computer. SSL uses the public-and-private key encryption system from RSA, which also includes the use of a digital certificate. SSL has recently been succeeded by Transport Layer Security (TLS), which is based on SSL.
Subnet mask	(*See* netmask)
Subnets	Portions of networks that share the same common address format. A subnet in a TCP/IP network uses the same first three sets of numbers (such as 198.63.45.xxx), leaving the fourth set to identify devices on the subnet. A subnet can be used to increase the bandwidth on the network by breaking the network up into segments.
SVP	SpectraLink Voice Protocol, a protocol developed by SpectraLink to be implemented on access points in order to facilitate voice prioritization over an 802.11 wireless LAN that will carry voice packets from SpectraLink wireless telephones.

Term	Definition
Switch	In networks, a device that filters and forwards packets between LAN segments. Switches operate at the data link layer (layer 2) and sometimes the network layer (layer 3) of the OSI Reference Model and therefore support any packet protocol. LANs that use switches to join segments are called switched LANs or, in the case of Ethernet networks, switched Ethernet LANs.
syslog	A protocol used for the transmission of event notification messages across networks, originally developed on the University of California Berkeley Software Distribution (BSD) TCP/IP system implementations, and now embedded in many other operating systems and networked devices. A device generates a messages, a relay receives and forwards the messages, and a collector (a syslog server) receives the messages without relaying them. Syslog uses the user datagram protocol (UDP) as its underlying transport layer mechanism. The UDP port that has been assigned to syslog is 514. (RFC3164)
TCP / IP	Transmission Control Protocol. TCP, together with IP (Internet Protocol), is the basic communication language or protocol of the Internet. Transmission Control Protocol manages the assembling of a message or file into smaller packets that are transmitted over the Internet and received by a TCP layer that reassembles the packets into the original message. Internet Protocol handles the address part of each packet so that it gets to the right destination. TCP/IP uses the client/server model of communication in which a computer user (a client) requests and is provided a service (such as sending a Web page) by another computer (a server) in the network.
TFTP	Trivial File Transfer Protocol. An Internet software utility for transferring files that is simpler to use than the File Transfer Protocol (FTP) but less capable. It is used where user authentication and directory visibility are not required. TFTP uses the User Datagram Protocol (UDP) rather than the Transmission Control Protocol (TCP). TFTP is described formally in Request for Comments (RFC) 1350.
TKIP	Temporal Key Integrity Protocol (TKIP) is an enhancement to the WEP encryption technique that uses a set of algorithms that rotates the session keys. TKIPs' enhanced encryption includes a per-packet key mixing function, a message integrity check (MIC), an extended initialization vector (IV) with sequencing rules, and a re-keying mechanism. The encryption keys are changed (rekeyed) automatically and authenticated between devices after the rekey interval (either a specified period of time, or after a specified number of packets has been transmitted).
TLS	Transport Layer Security. (*See* EAP, Extensible Authentication Protocol)
ToS / DSCP	ToS (Type of Service) / DSCP (Diffserv Codepoint). The ToS/ DSCP box contained in the IP header of a frame is used by applications to indicate the priority and Quality of Service (QoS) for each frame. The level of service is determined by a set of service parameters which provide a three way trade-off between low-delay, high-reliability, and high-throughput. The use of service parameters may increase the cost of service.

Term	Definition
TSN	Transition Security Network. A subset of Robust Security Network (RSN), which provides an enhanced security solution for legacy hardware. The Wi-Fi Alliance has adopted a solution called Wireless Protected Access (WPA), based on TSN. RSN and TSN both specify IEEE 802.1x authentication with Extensible Authentication Protocol (EAP).
Tunnelling	Tunnelling (or encapsulation) is a technology that enables one network to send its data via another network's connections. Tunnelling works by encapsulating packets of a network protocol within packets carried by the second network. The receiving device then decapsulates the packets and forwards them in their original format.
UDP	User Datagram Protocol. A connectionless protocol that, like TCP, runs on top of IP networks. Unlike TCP/IP, UDP/IP provides very few error recovery services, offering instead a direct way to send and receive packets over an IP network. It is used primarily for broadcasting messages over a network.
U-NII	Unlicensed National Information Infrastructure. Designated to provide short-range, high-speed wireless networking communication at low cost, U-NII consists of three frequency bands of 100 MHz each in the 5 GHz band: 5.15-5.25GHz (for indoor use only), 5.25-5.35 GHz and 5.725-5.825GHz. The three frequency bands were set aside by the FCC in 1997 initially to help schools connect to the Internet without the need for hard wiring. U-NII devices do not require licensing.
URL	Uniform Resource Locator. the unique global address of resources or files on the World Wide Web. The URL contains the name of the protocol to be used to access the file resource, the IP address or the domain name of the computer where the resource is located, and a pathname -- a hierarchical description that specifies the location of a file in that computer.
VLAN	Virtual Local Area Network. A network of computers that behave as if they are connected to the same wire when they may be physically located on different segments of a LAN. VLANs are configured through software rather than hardware, which makes them extremely flexible. When a computer is physically moved to another location, it can stay on the same VLAN without any hardware reconfiguration. The standard is defined in IEEE 802.1Q - Virtual LANs, which states that 'IEEE 802 Local Area Networks (LANs) of all types may be connected together with Media Access Control (MAC) Bridges, as specified in ISO/IEC 15802-3. This standard defines the operation of Virtual LAN (VLAN) Bridges that permit the definition, operation and administration of Virtual LAN topologies within a Bridged LAN infrastructure."
VNS	Virtual Network Services (VNS). A Enterasys specific technique that provides a means of mapping wireless networks to a wired topology.
VoIP	Voice Over Internet Protocol. An internet telephony technique. With VoIP, a voice transmission is cut into multiple packets, takes the most efficient path along the Internet and is reassembled when it reaches the destination.

Term	Definition
VPN	Virtual Private Network. A private network that is constructed by using public wires to connect nodes. These systems use encryption and other security mechanisms to ensure that only authorized users can access the network and that the data cannot be intercepted.
VSA	Vendor Specific Attribute, an attribute for a RADIUS server defined by the manufacturer.(compared to the RADIUS attributes defined in the original RADIUS protocol RFC2865). A VSA attribute is defined in order that it can be returned from the RADIUS server in the Access Granted packet to the Radius Client.
Walled Garden	A restricted subset of network content that wireless devices can access.
WEP	Wired Equivalent Privacy. A security protocol for wireless local area networks (WLANs) defined in the 802.11b standard. WEP aims to provide security by encrypting data over radio waves so that it is protected as it is transmitted from one end point to another.
Wi-Fi	Wireless fidelity. A term referring to any type of 802.11 network, whether 802.11b, 802.11a, dual-band, etc. Used in reference to the Wi-Fi Alliance, a nonprofit international association formed in 1999 to certify interoperability of wireless Local Area Network products based on IEEE 802.11 specification.
WINS	Windows Internet Naming Service. A system that determines the IP address associated with a particular network computer, called name resolution. WINS supports network client and server computers running Windows and can provide name resolution for other computers with special arrangements. WINS supports dynamic addressing (DHCP) by maintaining a distributed database that is automatically updated with the names of computers currently available and the IP address assigned to each one. DNS is an alternative system for name resolution suitable for network computers with fixed IP addresses.
WLAN	Wireless Local Area Network.
WMM	Wi-Fi Multimedia (WMM), a Wi-Fi Alliance certified standard that provides multimedia enhancements for Wi-Fi networks that improve the user experience for audio, video, and voice applications. This standard is compliant with the IEEE 802.11e Quality of Service (QoS) extensions for 802.11 networks. WMM provides prioritized media access by shortening the time between transmitting packets for higher priority traffic. WMM is based on the Enhanced Distributed Channel Access (EDCA) method.

Term	Definition
WPA	Wireless Protected Access, or Wi-Fi Protected Access is a security solution adopted by the Wi-Fi Alliance that adds authentication to WEPs' basic encryption. For authentication, WPA specifies IEEE 802.1x authentication with Extensible Authentication Protocol (EAP). For encryption, WPA uses the Temporal Key Integrity Protocol (TKIP) mechanism, which shares a starting key between devices, and then changes their encryption key for every packet. Certificate Authentication (CA) can also be used. Also part of the encryption mechanism are 802.1X for dynamic key distribution and Message Integrity Check (MIC) a.k.a. Michael. WPA requires that all computers and devices have WPA software.
WPA-PSK	Wi-Fi Protected Access with Pre-Shared Key, a special mode of WPA for users without an enterprise authentication server. Instead, for authentication, a Pre-Shared Key is used. The PSK is a shared secret (passphrase) that must be entered in both the Wireless AP or router and the WPA clients. This preshared key should be a random sequence of characters at least 20 characters long or hexadecimal digits (numbers 0-9 and letters A-F) at least 24 hexadecimal digits long. After the initial shared secret, the Temporal Key Integrity Protocol (TKIP) handles the encryption and automatic rekeying.

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